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INDEX TO CONTENTS, PAGE 337 - - - - - - - - - ADVERTISERS' INDEX, PAGE 22.

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THE UNITED GAS IMPROVEMENT COMPANY,

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CONTENTS.

An Asterisk (*) Denotes an Illustrated Article.

The Industrial Position of Artificial Gas, by John W. Lansley..... 337
* "Windolite" Fixtures, by Dr. Herbert E. Ives..... 340
Some Points of Interest in High Pressure Gas Submarine Pipes, by C. R. Phenecie..... 342
*The Gas Appliance as an Educational Factor, by J. H. Walker... 343

EDITORIALS—
Tenth Annual Meeting, Iowa District Gas Association—[Special Editorial Correspondence, by Telegraph]. 344
Briefly Told..... 344
Change of Date of Meeting of Canadian Gas Association—International Engineering Congress, 191 —Society of Gas Lighting Resolution on the Death of Mr. Dudley Digges Flemming—Commencement Day Exercises, Stevens Institute of Technology—New York Section, Illuminating Engineering Society—New England Section, National Commercial Gas Association—Mr James T. Lynn, President of the Natural Gas Association—"A Man"—Not Liable.
*The Equipment of a Domestic Science School, by D. G. Stroebel. 346
The Relation between the Melting Point and the Viscosity of Refined Tars, by Philip P. Sharples..... 347

SPECIAL ENGLISH CORRESPONDENCE..... 348
Exit the Photometer—Carbonic Oxide Again—The British Commercial Gas Association District Conferences.

NEW METHODS AND APPLIANCES..... 349
*Makes and Taps its Own Hole—*Denver's Cooking School—Accidents as Related to the Time of the Week—Heat Treated Structural Steel

Recent Patent Issues..... 350

ITEMS OF INTEREST FROM VARIOUS LOCALITIES..... 350
Mr. Graf Vice-President at Albany—Mason City, Ia., Franchise Extended—Porto Rico Progress—Yuma, Ariz., Rates—Toronto Educational Association—New St. Louis Plant—Personal—Proposition to Lambertville—Boston Lighting Contract—Plant Must Move—Personal Plant for Belle Fourche, S. D.—New Office Building at Springfield, Mass.—Allentown, Pa., Extensions—Plant for New Ulm, Minn. Soliciting Franchises—Personal—Additions at Hastings, Mich.—Demonstrating Surface Combustion—Roanoke, Va., Association—Ballooning—And Other Items.

UTILITIES COMMISSION NEWS..... 352
Appointed to New York Commission—Contest against California Compensation Law—Authority of West Virginia Commission Attacked—Discounts or Penalties—Ohio Commission Admits no Jurisdiction in an Important Matter—The Sangamon Circuit Court at Springfield, Ills.

Financial Notes..... 352
Public Lighting Table for June, 1914.....(Advertising Section) 10
Meeting Times of the Various Gas Associations " 27

The Industrial Position of Artificial Gas.

[Prepared for the Southern Gas Association, Mobile, Ala., by JOHN W. LANSLEY.]

In the hundred years that have elapsed since David Melville, of Newport, R. I., secured a patent on his coal gas apparatus, the artificial gas industry has grown to be one of the largest industries in the United States. The census of 1910 discloses that, in capital invested, it ranks third, being exceeded only by iron and steel manufacturers and lumber and timber products. Its remarkable development in a single decade, during which has entered many new fields of usefulness as "the fuel of the future", indicates that, after a century of endeavor devoted to overcoming prejudice and the competition of other heating and lighting agencies, its real possibilities are at last apparent to the public at large, to investors and to the operators of gas properties.

The early history of the so-called "illuminating gas," in this country and in Europe, is a story of progress temporarily impeded by the great cost of supplying service and the consequent high selling price, by the advent of kerosene, and later electricity in competition, and by the unreasoning opposition, amounting at the beginning almost to superstition, which so often has retarded the development of the world's greatest inventions. In the illuminating field, however, gas has met and surmounted all these obstructing influences, exhibiting a steady, if not astonishing rate of growth, being better understood and gaining a firmer hold on popular favor each year. Such changes have taken place in methods of manufacture, and such economies of operation have been introduced of late years, as to permit regular and consistent reductions in selling price, with coincident increase in consumption, until the use of gas, especially for cooking and heating, is now universally conceded to be a necessity of modern domestic life. Lower prices have been accentuated by more thorough service, better quality of gas, and improved appliances yielding greater efficiency at less cost to consumer, with the result that this clean, convenient and economical commodity is now in general use by families with small incomes. Scientific demonstration and practical experience have established beyond all question the hygenic, social and economic benefits of modern gas lighting and heating, and assure their permanency. "One thousand uses for gas," a common expression of the present day, proves that gas had not only arrived, but that it is never going back. In the many new directions in which it has been applied as fuel during the last few years, and in the rapidity with which the volume of consumption has increased and the price per 1,000 decreased, is to be found statistical support of the most optimistic predictions as to future development, and justification for the use of a time-honored, but expressive, phrase that, notwithstanding it is 100 years old, gas is still "in its infancy."

The United States census report for 1900 gives a brief summary of the gas business in America, from which the following interesting facts are gathered:

The history of the gas industry in this country dates from 1806, at which time David Melville lighted his premises with coal gas manufactured in a crude apparatus. In 1813 he secured a patent and later applied gas to the lighting of a cotton mill in Watertown, Mass. About this time gas was used in a mill at Providence, R. I., and in 1817 was employed as an illuminant in a lighthouse. In 1816 a company was chartered in Baltimore, Md., followed by one in Boston, Mass., in 1821. Mobile was one of the early cities to have a gas plant, and New York city adopted this means of lighting in 1823. Soon afterward, companies were organized in Brooklyn, N. Y., and Bristol, R. I., but it was not until 1835 that an ordinance was passed providing for a gas works in Philadelphia.

The slow growth of this industry during the first half of the Nineteenth Century, due probably to the antipathy of a large part of the general public, the high prices charged, and the reluctance of investors to finance a business requiring such large initial outlay, may be known from the fact that in 1850 there were only 30 gas making establishments in the country, and the total value of the gas produced annually was less than two million dollars. The following figures show the growth of the industry from 1850 to 1910, and are particularly significant for the past 10 years:

Year.	No. of Plants.	Capital Employed.	Yearly Production.
1850.....	30	$6,674,000	$1,921,746
1890.....	742	258,772,000	56,987,000
1900.....	877	567,001,000	75,717,000
1905.....	1,019	725,035,000	125,145,000
1910.....	1,296	915,537,000	166,814,000

From 1900 to 1910 the increase in plants was 419, or 47.8 per cent., while in the preceding decade, it was 135, or only 18.2 per cent. In 1910 the value of the annual product had increased $91,097,000 or 120.3 per cent. over 1900, while from 1890 to 1900 the increase was only 33 per cent. In amount of capital, the increase from 1900 to 1910 was $347,536,000, only slightly above the increase of the previous decade, $308,229,000. Notwithstanding this conservative financing, the rate of increase in capital being much smaller than in volume of business, the gas industry has reached the position of third, in point of capital invested, with the possibility of eventually being second, yielding precedence to the iron and steel industry alone.

In giving a true idea of the mammoth proportion to which the manufacture of illuminating and fuel gas has expended, a comparison with a few others of the greatest specified industries will prove both interesting and conclusive.

Specified Industry.	Capital Invested.
Iron and steel works, etc	$1,004,735,000
Foundries and machine shops	1,514,332,000
Lumber and timber products	1,176,675,000
Gas (illuminating and heating)	915,537,000
Cotton goods	822,238,000
Woolen goods	430,579,000
Malt liquors	671,158,000
Printing and publishing	588,346,000
Leather	332,727,000
Meat packing, etc	383,249,000
Tobacco manufactures	245,660,000
Men's clothing	275,320,000
Boots and shoes	222,324,000
Agricultural implements	256,291,000
Flour and mill products	349,152,000
Automobiles	173,837,000

Gas is here viewed as a manufactured commodity, and not in comparison with public utilities, such as railroads, electric telephone or telegraph companies. The capital of American railways is as great as that of all the manufacturing industries combined, exceeding $18,000,000,000.

Undoubtedly, the most remarkable period of development is the 10 years covered by the census reports of 1910, from which the following detailed information is extracted:

Year.	No. Engaged in Industry.	Wages and Salaries Paid.
1899	28,363	$17,709,000
1904	40,043	25,522,000
1909	51,007	35,316,000

Cost Materials,	Value Product.
$20,605,000	$75,717,000
37,180,000	125,145,000
52,428,000	166,814,000

That gas companies, as consumers of other commodities, and employers of labor, have not escaped the general increased cost of living since 1900 is here disclosed. Although the output increased $91,097,000 (120.3 per cent.) the cost of materials used increased 154.4 per cent. The number of persons engaged in the industry increased 80 per cent., while the amount paid in salaries and wages increased 88.1 per cent.

The product of the artificial gas industry during 1909, $166,814,000 (the value of the gas itself being $138,615,309) may be termed a gas bill of right smart size. It is greater than the value of all the petroleum produced in this country the same year ($128,328,487); greater than all the gold mined ($99,673,400) and all the silver ($28,455,200); it is over $100,000,000 greater than the value of all the natural gas ($62,206,941); all the Pennsylvania anthracite coal mined ($149,181,587). It is practically two-fifths as great as all the pigiron ($419,175,000), or all the coal, other than Pennsylvania anthracite ($405,486,777) taken from the earth during the same 12 months. It is interesting to note that while the Nation pays the gas companies $166,814,000; the American Manufacturers' year bill for tobacco is $416,695,000; for malt and distilled liquors, $579,429,000; for confectionery, $134,706,000; for jewelry, $80,350,000. So, while investors and operators have been bringing the gas business up to its position of third among manufactured commodities, the people as a whole have been paying more than three times as much for their drinks, more than twice as much for their smokes, nearly as much for their candy, and half as much for their jewelry, as they have been paying for their gas.

These facts lead naturally to the subject of prices, and under this head are to be found some of the most noteworthy features of the development. Notwithstanding the vast increase in capital invested, the continued rise in the cost of manufacturing materials and wages, accompanied by more and more exacting requirements in the service, we are confronted with the evidence of a constant decline in the prices at which gas is sold. Among all the great manufacturing industries listed in the census reports, artificial gas stands alone in exhibiting continuous and substantial reductions in price to the consumer. In this respect, therefore, it has had material effect in retarding the increase in the cost of living in general. This situation is the outgrowth of an increasing popular demand for this modern, labor-saving, sanitary and inexpensive fuel and illuminant, coupled with the ability, enterprise and experienced operators who have persevered in seeking new fields of application for artificial gas and in bringing about greater economy in methods of production. From the beginning its price has been going down. During the earlier years the cost of manufacture and distribution was so great that its use was limited to lighting exclusively. Thus the term "illuminating gas," became so firmly established that it is only recently that its commercial name has been properly changed to "manufactured" or artificial gas.

In New York City the price of gas in 1826 was $10 per thousand cubic feet; in 1846, $6; in 1866, $3.50; in 1886, $1.25; in 1900, $1.05. In 1901 it dropped to $1, and finally to 80 cents, the present rate.

These figures are a very fair epitome of the conditions that prevailed generally allowing for differing local influences and degrees of development. The arrival of "dollar gas" about 1900 was concurrent with what may be well termed "a new era" in the industry, and since then the price has continued to decline in inverse ratio to the growth of the business. In large cities, as in New York and Chicago, where the per capita consumption is very large and cost of distribution relatively less, the "straight" or uniform rate has been reduced considerably below $1. In others, where smaller consumption and slower development have not permitted the reduction of the base rate to or below $1, progressive companies have found means of opening up new fields and stimulating industrial uses by sliding scale or quantity rates, by which the price on large quantities may be brought much lower. The sliding scale has been a potent influence in the increase in the use of artificial gas as fuel, and its possibilities are boundless. The system of lower prices in proportion to quantity used has been established as correct by investigation by State Commissions and other regulating bodies. It is recognized as a sound business principle, applicable in every line of trade.

It does not make for higher prices to the small purchaser but for lower price to all classes. A recent investigation by the Wisconsin Commission, found that about 70 per cent. of the persons using gas in Milwaukee, the ones usually designated "small consumers," are paying less than their share of the cost of service and using only one-third of the gas sold. In this case the Commission ordered, as fair and just to all, a quantity rate schedule by which the minimum price to large users is 40 per cent. lower than the maximum or base rate.

In a business so vitally affected by geographical and social conditions, it would be unfair and useless to compare the prices in different cities, even of the same size, but almost without exception the trend to lower prices for gas is felt in all cities of the country. Statistics show these totals and averages for the United States-

Year.	Cubic Feet Sold.	Amount, Sales.	Av. Price per M.
1900	67,093,553,000	$69,432,582	$1.035
1905	117,866,000,000	111,000,956	.94
1908	156,909,310,000	133,571,122	.85
1912	212,381,168,000	148,282,725	.70

These figures include all the gas sold for fuel and lighting by the companies reporting including that produced in retort ovens and sold to steel works and other industrial establishments at prices lower than possible for domestic consumption. In 1900 artificial gas for fuel was just beginning to be appreciated, and to the rapid growth along this line, to sliding scale rates on large quantities, and the introduction of more efficient gas burning appliances is to be ascribed is most part the astonishing decline of 32 per cent. in the average price of gas, during a period in which the average price of all other commodities increased 33.6 per cent.

From the reports of the U. S. Geological Survey the rapidity with which artificial gas has come into wider use as fuel is ascertained:

Year.	Cubic Feet Used, Fuel.	Value.	Av. Price.	Per Cent. of Total.
1905.....	31,516,000,000	$27,983,513	88.8	27
1908.....	47,619,193,000	39,677,034	83.3	30
1912.....	112,390,847,000	67,751,473	60.0	53
	Cu. Ft. Used, Light.			
1905. ..	86,350,000,000	83,026,442	96.1	73
1008.....	109,290,117,000	93,894,088	86.0	70
1912.....	100,000,321,000	80,531,252	80.0	47

It should be borne in mind also that in present day domestic use of gas it is impossible to estimate with exactness the quantities consumed in lighting and as fuel. The substitution of quantity rates for the former lighting and fuel rates in many cities naturally results in passing the gas used for both purposes through the same meter.

In the earlier days of the gas lighting business, the advent of kerosene and improved oil lamps was of threatening import, because of the relatively low candle power and high price of gas. This situation led to the invention of the Lowe process of water gas manufacture. Starting in the seventies, the manufacture of water gas grew in favor and eventually the larger part of the artificial gas sold was of this character, estimated at one time to be 75 per cent. of the total. The introduction of electricity which was at first believed to be the death knell of gas lighting, has not checked the development of the gas industry in general. In fact, if may be accepted that much of the growth in our business has been due to the stimulating effect of electric competition.

The incandescent mantle, though giving better illumination, with smaller consumption of gas has been an important factor in the development of recent years, enabling the gas lamp to maintain its position of superiority in high efficiency and low cost. It has eliminated the necessity of high candle-power gas, an expensive requirement when open flame tips were in general use. The incandescence of the mantle being produced by the heat energy, without regard to candle-power, has served to repopularize coal gas for all purposes. The relative gains in this branch of the industry since 1905 are shown in the following table:

Year.	Cu. Ft. Coal Gas.	Value.	Av. Price.	Per Cent. of Total
1905.....	40,454,000,000	$32,937,456	81.4	34.3
1908.....	53,561,813,000	37,227,901	70.0	34.1
1912.....	89,692,372,000	36,681,884	41.0	42.2
Year.	Water and Oil Gas.	Value.	Av. Price.	Per Cent. of Total.
1905	77,412,000,000	$78,072,500	1.008	65.7
1908.....	104,347,497,000	96,343,251	.93	65.9
1912.....	122,697,796,000	111,600,841	.91	57.8

There was a general decrease in prices in 1912 compared with 1908, except in the value of oil and water gas, but the chief cause of the apparent decline of nearly 20 per cent. in the mean average price, was the largely increased production of retort coke oven gas, extensively used at manufacturing plants connected with the coke works and charged at nominal prices, much of it at less than 10 cents per 1,000 cubic feet. The average price of oil and water gas sold for illumination in 1912, was a fraction higher than 1908, the figures being, respectfully, 92.4 cents and 92 cents per 1,000 cubic feet. The average price of this gas sold for fuel shows a declined from 98 cents in 1908 to 89 in 1912. The average price for coal gas, which includes the surplus gas from retort ovens, was 70 cents in 1908 and 41 in 1912. The decline in the average pricee of this gas used for fuel was nearly 50 per cent.—from 65 cents to 33 cents. The average price of illuminating gas used in 1912 was less than 1908, coal gas falling off about 620,000,000 cubic feet, and oil and water gas more than 8,600,000,000 cubic feet. On the other hand, the use of gas as fuel shows a marked increase—from 47,619,193,000 cubic feet in 1908 to 112.390,847,000 in 1912. This was chiefly in coal gas—from a little over 21,000,000,000 in 1908 to nearly 58,000,000,000 in 1912—though the use of oil and water gas as fuel shows an increase of more than 100 per cent.—from 26,500,000,000 cubic feet in 1908 to 54,500,000,000 in 1912.

The steady decline in the average price of artificial gas the country over, is especially striking in comparison with reports of the U. S. Department of Labor, on the rapid and sustained rise in prices of practically all the commodities of every day life, while gas has gone down 32 per cent.

Commodity.	Inc. 1900 to 1912.
Fuel and light (coal, oil, etc.).....	32.9 per cent.
Lumber and building materials.....	48.2 "
Clothes and clothing	20.7 "
Food and food products.....	39.5 "
Farm products.....	71.3 "
Total raw commodities.....	49.5 "
Total manufactured commodities	29.7 "
Total all commodities.....	33.6 "

In retail prices, the advance during the period named has been even more marked, the increase of 15 principal articles of food being 57.9 per cent.

Comparison of growth in the manufacture of gas with the growth of the population in cities shows that the use of gas is increasing more than three times as fast as population. From 1900 to 1910 the increase in the urban population of the United States was 34.8 per cent., and the increase in the value of the illuminating and heating gas produced 120.3 per cent. This signifies increasing consumption per capita and consequent decreasing cost per thousand cubic feet, especially in distribution. The foregoing facts supply convincing proof of the growing favor with which gas is regarded by the general public and that this staple and cheap commodity has become, unquestionably, one of the necessities of modern life in America.

The safety, stability and all round desirability of gas bonds from the investor's point of view are fully recognized by financial authorities. Their record is not excelled by any class of securities, even among public utilities, which are conceded to be in general the safest and most desirable of all. Mr. Lawrence MacEntyre is authority for this statement:

"Gas bonds merit the very highest degree of confidence. While it has been impossible to get the exact figures, there is in the neighborhood of $400,000,000 invested in the mortgage debts of gas companies in the United States, and of this enormous amount probably less than 1 per cent. of the interest is in default, a record not equaled by any form of investment other than United States government bonds."

Tangible property, of course, is the basic security for mortgage indebtedness, and bonds are formal instruments representing such loans in fractional parts. The physical value of gas properties compared with the volume of business and operating expenses of most other great industries, is relatively very large. One-half of the total investment is in underground construction. Every part of a gas plant is of stable and permanent character, and depreciation of works and distribution system is relatively low. Thus no more favorable basis could be afforded for the investment of funds.

Next in importance to physical value as security is net earning power, as distinguished from volume of business. With a product valued at $166,814,900 in 1909 on capital of $915,537,600, the artificial gas business is turning over its capital only once in 5½ years, while many lines of industry expect to turn over the capital two or three times each year. An idea of the net earning power of gas, however, is obtained from the fact that during 1909 the total expense for manufacturing materials ($52,428,000) and salaries and wages ($33,316,000) was $85,744,000. Adding to this taxes of $7,836,000 (about 4.6 per cent. of gross value of product), the total operating cost is $93,580,000 leaving $73,234,000 to expenses, depreciation and dividends. It is apparent that in fixedness or permanence of earning power, those corporations are best which supply commodity looked upon as a necessity—one of which each individual uses a small quantity, and one which every individual needs. Under such circumstances, the proportion of the individual's income expended is very small, while the total consumption of the commodity is very large. This is why public utility bonds are more attractive than others to careful investors, and for the same reason periods of financial depression—even panics—have not had, and cannot have injurious effect upon the sales of artificial gas, or upon the real value of gas securities.

Gas companies are more certain, perhaps, than other public utilities to retain their character as monopolies. The good of the public service will ever require it. The extraordinary first cost of preparing to supply a city with gas, with one-half the construction underlying the streets and thoroughfares, prohibits the duplication of investment, whether by municipal or private capital. Competing gas companies could not exist in any city without adding to the cost of service to the public, in either interest or taxes, and the users of gas would be required sooner or later to carry the burden of duplicated

investment. The elements of necessity and monopoly can never be disassociated from the artificial gas industry, and while they justify and invite regulation by the State, they also assure, through such regulation, protection of the investment. Legislative action, as demonstrated by the labors and experience of public utilities commissions in various States, has shown popular trend in this direction and it will not be long before such commissions are established in practically every State in the Union. Under all such legislation lies the principle that the State, having once assumed authority over public service properties, will never allow confiscation of invested capital or permit such careless, inefficient or dishonest operation as would imperil the interest or principal of the bonded debt. By exercising its power to regulate rates and prescribe adequate service, the States interposes the bulwalk of Justice to protect investors against confiscatory or unreasonable rates or requirements. One result of the universal regulatory tendency has been to lessen the importance attaching to terms of franchises. While public utility companies are now generally debarred from exacting exorbitant or unreasonable profits or neglecting the requirements of adequate service, though their franchise grants might permit of both, municipalities, on the other hand, may not take unfair advantage of established and properly managed concerns upon the expiration of franchise contracts. Formerly, the duration of a franchise, rates named and requirements specified were of the most vital importance in fixing the status of mortgage bonds, but at present they are of much less significance, though not, of course, without direct influence on values.

A general view of the industry shows that capital has always profited in fair measure by investment in this class of securities, but seldom to an exorbitant or unreasonable extent. The ability, enterprise and conservatism of the gas business are proved by its great expansion on steadily falling prices. Its strength and soundness are evidenced by the fact that in every section of the country gas companies have undergone the most searching scrutiny as to methods of financing and operation, and with scarcely an exception have justified the confidence of their bondholders and the people served. Marked changes are taking place in the public mind in its attitude toward public utilities, and particularly toward gas companies. In every city gas is now recognized as an important an necessary commodity demanded by modern standard of living. Genius and perseverance have beaten down prejudice a century old; progressive and efficient management has dissipated whatever suspicion may have once existed. Exploitation of the public for excessive profit has ceased. Political exploitation of public utilities is no longer effective. Co-operation is fast becoming the rule and hostility the exception.

"Windolite" Fixtures.[1]

By Dr. Herbert E. Ives.

The most valuable fruit of any study is its application. Any thorough investigation of the elements of a lighting installation should reveal the underlying principles. If the analysis is sound it may be expected to lead further. It should on the one hand point to the elimination of the undesirable and the non-essential and, on the other hand, to the invention of improved and hitherto untried devices. A study of the factors which make daylight so generally agreeable ought accordingly to culminate in some means for producing the same good effects without lighting up "all out of doors." A study of this sort recently made by the writer suggested some novel lighting devices, two of which are now to be described.

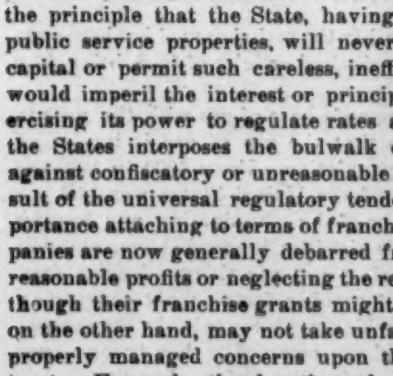

Diagram showing distribution of illumination from a window.

First, however, let us review the results of the previous study. It appeared, first of all, that daylight is not necessarily or uniformly satisfactory, consequently a pleasant daylight condition had to be chosen and analyzed. This condition was presented by the second-story room of a house whose windows face the open street. Opposite were comparatively dark houses. Above was a broad stretch of bright sky; below, the illuminated street. When the shades are drawn, so as to conceal the bright sky from the room's occupants, the distribution of illumination and of visible surface brightness is admirable. On analysis the chief characteristics to be found were:

(1) The light source, namely the sky, is concealed.

(2) The light sources are of large area and low intrinsic brilliancy.

(3) The greater part of the light flux falls upon the lower part of the room.

(4) No extremes of intrinsic brightness are visible, especially in adjacent surfaces.

(5) The light flux is from the side.

The distribution of illumination from a window is shown in Fig. 1. Notice the great preponderance of light flux on the lower portion of the room; the great distance from the window at which the illumination of the floor is still high, due to the 50 or 60 square feet of sky space over the street; the illumination of the ceiling from the street; and the low horizontal component, corresponding to the very low intrinsic brightness of the houses opposite. The window is here considered as a point light source, but only for convenience of drawing; actually it is of such large area that the distribution curve varies from point to point throughout the room, and thus the shadows of objects are soft.

Of all the characteristics of this window illumination, probably the most essential is the concealment of the light source. It is a question whether satisfactory illumination can be achieved with a visible light source, even if its intrinsic brilliancy is as low as that of the ceiling of an "indirect" installation, or as the overcast sky. In the latter case the whitest object illuminated can only just reach the brightness of the sky; all other objects must be less bright, with consequent less power of holding the observer's eye. When the source which actually lights the object—the principal light source—is concealed from the sight, then illuminated objects can be the brightest in the field of view. Reasoning along these lines has led to the concealment of the light source as the first essential in the new fixtures.

Perhaps, next in importance to concealment is the flooding of the lower part of the room with light. To this is due the charm of a sunlight room; and to its absence is due, probably more than anything else, many criticisms of the bright ceiling systems—indirect or semi-indirect. In them, of necessity, the upper part of the room is brighter than the lower—just the opposite of daytime lighting from windows.

The other factors—large area of source, direction from side, avoidance of extremes of intrinsic brightness—have all been considered in these designs, but in this respect they do not present perhaps quite so great a departure from many now on the market, as in their attention to the points described in detail.

The first "windolite" figure is shown in Fig. 2. It consists essen-

Fig. 2.—"Windolite" Fixture with Upright Welsbach Burner.

1. "Lighting Journal."

tially of side-wall unit, either in the form of a standard, as shown, or of a table lamp. Its distinguishing features are, first, the concealment of the principal light source by the very low intrinsic brilliancy large area-screen; second, the absence of any back to the screen, the wall of the room, necessarily of light covering, forming the back reflecting surface, The distance of the unit from the wall and the intrinsic brilliancy of the shade are so adjusted that the contrast between shade and wall seen adjacent to it, is very small, only so much in fact, as will suffice properly to differentiate the light from the wall. Practically this means that the chief source of diffused illumination in the room is a large area of wall space, comparable with a window. The light going over the top of the shade illuminates the ceiling, which becomes a secondary light source; that going below illuminates the book or the object of interest, as well as the floor, which latter presents the bright sunlit appearance of daylight.

The mechanical construction of this fixture is shown clearly in the photographs. The standard can be made to harmonize with furnishings of any period; here it is an Ionic pillar in Colonial treatment. The shade is covered with silk, cretonne, or other material in harmony with the furnishings of the room or with the style of the pedestal. It is lined with a transparent gray material, so that the interior, viewed from the level of a seated person's eyes, is not unduly bright. A small reflector, placed behind the light source, serves to regulate the brightness of the wall behind and also to throw additional light on the ceiling.

This type of wall light exhibits most of the characteristics of a window with respect to direction of light flux, small contrast with its back ground, low intrinsic brilliancy, large area of the visible bright surface, and, finally, in the perfect concealment of the light source to which is due the flood of light falling on the floor. It differs from a window chiefly in that the principal light source is small, having an area of only a few square inches, instead of feet, and that it is not possible to put the shade sufficiently far in front of the light to allow the rays from the latter to sweep all the way across the floor. As a consequence the falling off of illumination as one moves away from the unit is faster than from a window. This may be compensated for, to some degree, by throwing a larger proportion of light toward the ceiling than it gets by day, so that the diffused illumination of the back of the room is increased.

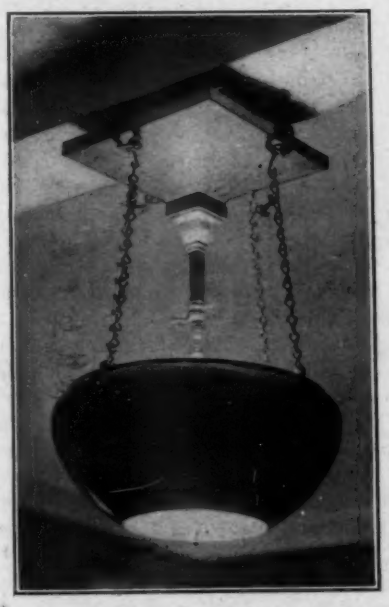

Fig. 3.—Pendant "Windolite" Fixture.

These wall units have been on trial for the greater part of a year and have proved very satisfactory in the softness of illumination effect obtained. They lend themselves particularly well to decorative treatment, being things of beauty by day as well as when lighted. In the second "windolite" fixture, Fig. 3, the factor of direction from the side was not considered. Attention was focussed on concealment of the principal light source, large flux upon the lower portions of the room, low intrinsic brilliancy, large area and low contrasts in the visible bright surfaces. Fig. 4 shows the unit in section. The light source is an inverted Welsbach mantle, which of itself gives a large lower hemispherical light flux. Surrounding it is an upward directing reflector, either opaque or translucent, the bottom of which can either be left open or furnished with a transparent cathedral glass or any other diffusion destroying plate. The dimensions are so calculated that the reflector conceals the mantle from the occupant of the room in any normal position, and redirects to the ceiling the light which otherwise would strike their eyes. The ceiling thus illuminated becomes a low brightness source of diffused light. The most striking characteristic of this unit is well exhibited by Figs. 5 and 6. Fig. 5 shows an ordinary

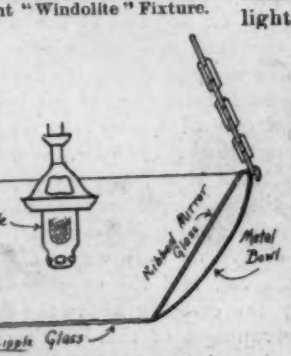

Fig. 4.—A Cross-section of the Unit shown in Fig. 3.

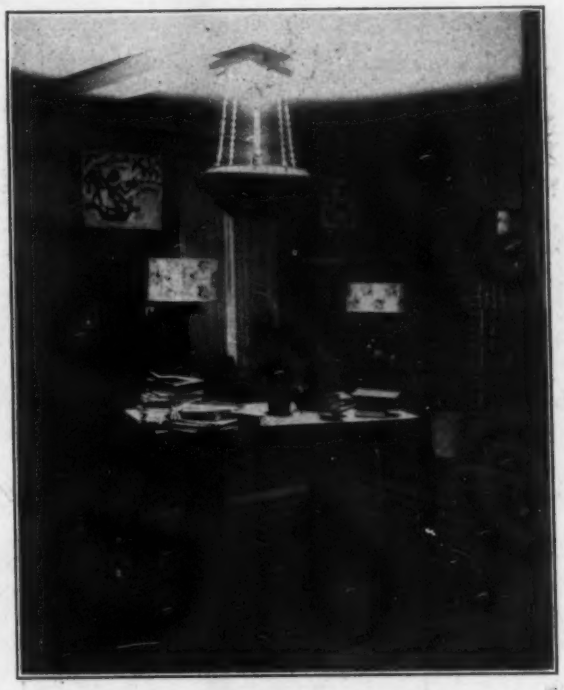

Fig. 5.—Ordinary indirect fixture. Note the absence of illumination on the floor beneath the fixture.

Fig. 6.—A "Windolite" fixture. Note the increased illumination directly beneath the fixture.

indirect fixture. Note the excessive brightness at the top of the room, the gloom of the lower part, the absence of clear cut shadows, such as those caused by sunlight from a window. Fig. 6 shows the very different effect obtained with the new fixture. Table, chairs and floor are now adequately illuminated, while, due to the concealment of the light source no annoying bright spots are visible.

Obviously this type of "windolite" fixture can be made of translucent glass, which probably lends itself to better decorative effects than metal, wood or other opaque material. But for completeness of concealment and other desirable characteristics, the opaque reflector is superior. This fixture is peculiarly well fitted for that average room in a small house which is already possessed of a central outlet and a light tinted ceiling. It is also well suited to counter illumination, for dining table, to the lighting of machines in factories, to office desks and other similar uses.

Fig. 7 shows a living room illuminated by the two types of fixtures

Fig. 7.—Note the effect of the illumination from the two "Windolite" fixtures, also the "Windolite" portable table lamp.

jointly. The unique characteristic of this room is that every part is amply lighted for the normal activities one would wish to carry on; that high intensity of illumination is furnished where one would read or work; that the softness of daylight shadows is preserved in all except the highly illuminated parts, in which the effect is that of sunlight. The normal daylight balance of brightness distribution is present and, finally, one may occupy the room for hours without experiencing any of that eye-weariness usually associated with artificial light.

Some Points of Interest in High Pressure Gas Submarine Pipes.

[Read before the Wisconsin Gas Association, May, 1914, by C. R. Phenecie.]

High pressure gas distribution is becoming common practice in cases where the demands of economy, distance and quantities warrant it; and the problems and difficulties which surrounded it a few years ago are to-day, thanks to the talented engineers and courageous financiers in the fraternity, nearly solved. One of the incidentals to high pressure gas construction which has caused difficulties from time to time is the laying of submarine pipes. The fact that the condition, contour elevation, etc., of the bed upon which the pipe must lay are more or less unknown; that small leaks are not easily detected; that inspections are difficult and expensive, and necessarily intrusted to divers who are inexperienced and whose judgment of what constitutes good or bad conditions is not mature; indicate that submarine pipe should be avoided as far as possible.

When the lines must cross wide or deep bodies of water that are held by our government as navigable streams, the difficulties are greatly accentuated, because, in addition to the drawbacks already mentioned, are the menaces of dragging anchors, greater depths and swifter currents, with the consequent difficulties of laying and maintaining lines under these conditions; and last, but usually not least, the fact that the approval of locations and conditions of service must be secured from the engineers of the War Department. These last named gentlemen will be guided by conditions favorable to navigation rather than by convenience or reliability to the gas company. Instances of high pressure gas installations across navigable streams are rare in the United States and have not always been unqualifiedly successful. One of the pioneer installations and one which has unique features was made in 1901 under the direction of Mr. H. L. Rice, at Norfolk, Va., to connect the plant at Norfolk with the distribution system at Berkley. Mr. Rice outlined this briefly in his discussion of Mr. Shelton's paper on high pressure distribution before the Western Gas Association in 1903. The Elizabeth River at the point of crossing is about 800 feet wide and is really an arm of the sea, in that it is salt and affected by the tide. The bed of the stream is uneven, and after studying this condition thoroughly and taking into consideration the fact that the water was salt, Mr. Rice, with the courage of his conviction, declared for lead pipe. He realized that steel pipe would not conform to the uneven bed of the stream and that with boats constantly moving, swinging and turning over this proposed location the pipe to be secure must be embedded in the mud on the bottom as much as possible. The owners of the property did not see fit to follow this reasoning and insisted on steel pipe which was accordingly placed after several attempts. The pipe was laid with a number of swing joints which allowed it to take the bed of the stream fairly well. Nevertheless there were undoubtedly places where it was above the bottom and a few days after it was placed and tested it was carried away by a vessel letting its anchor hang while getting under way. After this experience the owners decided to allow Mr. Rice to go ahead with the lead pipe. Extra heavy pipe was used and in as long lengths as possible. It was laid out on a barge so that it would pay out with as few kinks as possible and the joints to be made were wiped by a plumber. A rope with sinkers attached was then drawn across the river at low tide in an absolutely straight line. When all was ready and at slack tide, one end of the lead pipe was fastened to the shore, and paying it out over a reel, the barge was pulled across the channel by hauling the rope on board as rapidly as possible. It only took a few minutes to lay the whole pipe. Then leaving both ends free for a considerable time the pipe was encouraged to settle in the mud, after which it was connected up. This pipe was followed by a second because the cost of the pipe was not very great and it seemed safer to have two in case one should give away. These pipes are still in use and giving satisfactory service, and are the only installation of high pressure submarine pipes of lead. Lead pipe, of course, does not corrode in salt water, which is a great advantage. The gas delivered to Berkley is pumped by electric driven compressors which suck from a large low pressure main, which it so happened was convenient on the Norfolk side. No attempt is made here to get out the water, it is pushed ahead with the gas and finally appears at the holder drips on the Berkley side of the river. The gas is pumped intermittently as required and the whole thing is an economical installation. I am indebted to Mr. Rice for the description of this unique installation.

One of the most notable installations several years ago was that at New Orleans, across the Mississippi River, described by Mr. Thos. D. Miller, before the Western Gas Association, in 1903. The length of this crossing, approximately 2,100 feet, the extreme depth 120 feet, the swift current, and the fact that in the bed of the stream a number of wrecks of old crafts lay, as well as the size of pipe laid with 300 pound sleeves, rendered this engineering undertaking of especial interest. The method of putting the pipe together in sections at the bank and pulling it across the stream by steel cables, rather than lowering it into the stream from barges, was notable. The cost of this installation was given as about $10,000. Unfortunately, after about 3 years of service, boat anchors tore this pipe away, and it was finally abandoned and a separate plant erected across the river at Algiers. In casting about for precedents to study and follow in our proposed installations at Green Bay, we were not able to learn as much from the experience of others as we would have wished.

The Wisconsin Public Service Company obtained a franchise for furnishing high pressure gas to the City of DePere, having a little more than 5,000 inhabitants, located on both sides of the Fox River, about 6 miles south of Green Bay. The river, as it passes through the main portion of DePere, is about 1,600 feet wide, with one bridge spanning it at its widest part, with a draw span approximately 100 feet. Just above this bridge is a dam, and passing under the draw span is a canal and system of locks, and below the dam and bridge is a series of rapids.

The first thing to settle was the point best to cross. Below the dam the water was comparitively shallow, but swift and turbulent as it tumbled over the rocks, and on account of the uneven profile of the bed of the stream and currents, this was rejected. At the bridge we considered a short submarine pipe under the draw and the extension of this either way on the substructure of the bridge. This plan was abandoned, partly from fear of winter freezing, its exposure to dirt and acids leaking through the bridge floor, the many electric and telephone wires already located there, and the opposition we knew we would encounter from the war department engineers in charge of navigation. There were also franchise restrictions, that the pipe should not lay along drive ways, or walk ways, and therefore must be placed on brackets or shelves, and the expense of elaborate pipe coverings. This left only the crossing above the dam in comparitively deep water. The advantages of this location were ready approval of government engineers, comparitively quiet waters, a chance to take advantage of a narrow part of the river, good approaches, and mains properly located for easy distribution on both

sides. The river at the point selected was 862 feet from shore to shore and joined Lewis Street extended on the east bank to Oneida Street on the west bank. Careful sounding developed no abrupt changes of contour, showing a gradual sloping bed, to a depth of 22 feet, covered with a layer several feet thick of mud or ooze, among which were scattered logs, tree stumps, some boulders and other debris. A river outfit was engaged, consisting of a tug, one scow, 75 feet long by 22 feet wide, with flat smooth deck, and riding unloaded about 3½ feet out of water. The scow was especially equipped for the service, with 2 large hand crabs fore and aft, each crab provided with 150 feet of 1¼-inch manila rope, and 4 heavy anchors, each with 150 feet of rope. There were also several flat bottom row boats and a steam shovel on barge, with 1½ ton clam shell bucket.

In order to prevent trouble with marine craft and ice near the shore, the plan was to keep the pipe several feet under the normal bottom near the shore, and the clamshall was put to work excavating a trench, beginning about 60 feet out in the stream, and excavating a gradually deepening ditch as it proceeded towards the banks, so at a point several feet back from these banks the pipe would lay about 8 feet beneath the surface. After the pipe lines had been laid down the river bank on either side, and the trenches properly excavated and carefully graded out each way, the course of the pipe was laid out in a straight line across the stream by poles or markers on either bank. The special extra pressure steel pipe (selected to obtain long lengths (22 feet) and extra good threads) was given 3 coats of high grade pipe paint, applied hot to the hot pipe. This screwed together in four length sections, with three special river sleeves of the Dresser style No. 3, making 12 sections in all, were loaded on the scow. Each section was given a soap-suds test here with 40 pounds gas pressure from a temporary pipe to the 2-inch main, which had previously been laid to the waters edge.

Starting at the west bank it was proposed to pay out these sections one after another from the large scow, thence over the flat bottom boats into the river, the idea being to avoid abrupt descents and heavy sags or strains calculated to strip the threads. It was intended to keep the pipe dry inside at all times so as to be able to take full advantage of its buoyancy. We had at first thought to use blocks of wood as floats to further ease the grade of the pipe in the water, but careful calculation of the specific gravity of the pipe and sleeves showed its weight under water to be not greatly in excess of the water itself. A picked crew of 10 men furnished by us and a crew of 8 men furnished by the dredge company constituted the force. The pipe sections having been loaded on the scow, a start was made from the west bank of the river at 6 A.M., with the weather bright and calm. Anchors were put out 150 feet from the off shore end of the scow and in line with the shore markers so as to give the crabs proper pull on a main line 200 feet out in the stream. The first section of pipe laid was snubbed to a tree on the west bank of the river, and the second section connected was easily handled owing to the scow being grounded; but as the scow got in the deeper water and the pipe settled into the shore trench which the dredge had prepared, the work of laying and connecting became more difficult. You understand there were no street ells or expansion joints in this line, only ordinary river sleeves being used. As the end of each section of pipe was payed off the rear of the scow the next section of pipe was brought into place and the river sleeve applied. first the pipe connection being made with the thread inside of the sleeve proper and next the rubber sleeves or gaskets being drawn into place by the four longitudinal bolts. A 4-inch roller on the rear of the scow permitted the pipe to roll over it and down to the water. We experienced no trouble whatever until this work had progressed to the middle of the stream where the current was strongest and at this point, shortly before noon we came very near dropping the end of the laid pipe on two different occasions. This was partly due to the current and to the fact that the front crab in towing the barge ahead allowed it to acacquire too much momentum. A 1-inch rope was however kept secured to a point near the end of the laid pipe so that if it had been dropped overboard it could be recovered. At noon, as the work had progressed very nicely as far as the middle of the stream and with the laid portion of the line properly made fast to the scow and the scow anchored exactly in line, all hands were piped down for dinner, served table d'hote from the dinner pails. The advantages of this method of lunching are apparent in case an extraordinary wind or other emergency arose. After dinner the work was resumed. As we neared the east shore the pipe was guided up stream, suspended along side the scow and gradually lowered into the trench which had been excavated by the dredge; and when this was done the actual work of laying the river crossing was finished and we had an open end of pipe anchored on each shore, care being taken to allow slack so that the pipe could settle. The next day the shore connections were made, first, on the west side where the pipe had been started. Owing to the nature of the shore and the deep water on the east side, it was handled as follows: A coffer-dam of clay inclosing a space about 8 feet in diameter was constructed and the pipe properly centered was gradually worked down through this clay as the water was removed from the shore or inclosed part of the coffer-dam; and when the shore end of the pipe and the river end was exactly in line, a common long pattern Dresser sleeve was connected and the coffer-dam broken down. The gas was then let in the line and men in boats patrolled over the line several times to ascertain if pipe or connections were leaking, but a careful search showed no leaks. Gas pressure of 30 pounds was then put on the line with a gauge connected, and the line cut off from the supply and allowed to stand 2 hours, but there was no perceptible drop.

Being assured our line was tight, the next step was to employ a diver and tender outfit, to examine the pipe as it rested on the bed of the river and place weights to hold it down. The weights as designed consisted of sections of ⅝-inch galvanized steel messenger wire 18 inches long. On each end of which and covering 4 inches were cast slugs or balls of grey iron, weighing approximately 30 pounds. They were designed to straddle the pipe and add sufficient weight to hold the pipe rigidly in place, and yet be easily removable in case the pipe should have to be raised at any time.

The diver spent about 8 hours examining the pipe and placing the weights, and finally reported the pipe resting easily, and nearly buried in the bed of the river. At one point the driver reported the pipe had dropped into space about 8 inches wide, between two huge boulders, weighing many tons, so the Goddess of Chance had done some engineering too. With the pipe laid, examined by diver and tested, it was put into regular service and so continued for a year, and we trust it will remain in service for many years to come. Mr. F. E. Newberry had personal charge of the work for the company, and I am indebted to him for a description of the details.

Owing to the building of a new bridge at Mason Street, we were compelled to lay a temporary 2-inch line for high pressure at this point, to replace a 4-inch line under the old bridge, but now removed. I show some pictures of this job, which does not offer any features differing essentially from the DePere job, except as to the joints. Since this was a temporary job, a combination of two street ells was used, as shown, which allowed the necessary flexibility for quick and easy laying, and is also comparitively tight. After some 30 days of service, tests do not disclose any leaks on this line.

The Gas Appliance as an Educational Factor.

[Read before the Wisconsin Gas Association, May, 1914, by J. H. WALKER.]

The value of cooking schools to a gas company should be considered from a number of view points outside of the income derived in dollars and cents, and I feel that its real value has never been thoroughly appreciated by the gas fraternity. Its value as an advertising medium cannot be estimated in cold figures. When we consider the number of children who receive the benefits of the domestic science courses in our public and private schools, and they number into the thousands, is it not natural that the child should exploit the instruction received for the edification of the parents and in enthusiasm endorse the time honored phrase "Cook with Gas," the only fuel that can be successfully used in domestic science instruction. This statement is broad, and rightfully so, as gas is the only fuel that can be conveniently distributed through the medium of individual stoves, so that each student may become thoroughly versed in the care and manipulation of the gas appliance as well as the preparation of the food. Coal, oil or wood are not desirable for this work, as the danger and non-sanitary features and necessarily bulky construction of the appliances preclude the use of individual stoves. Is it not then reasonable to suppose that the insistent and enthusiastic student will be a very great factor in advertising the use of gas for fuel in the home?

The cooking school not only teaches the art of food preparation but also instills in the mind of the student ideals of sanitation as applied in the kitchen and at an age when the impressions received

(*Continued on page* 346.)

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NEW YORK, MONDAY, JUNE 1, 1914.

[Special Editorial Correspondence, by Telegraph.]

TENTH ANNUAL MEETING, IOWA DISTRICT GAS ASSOCIATION.

DAVENPORT, IA., May 27th, 1914.

Promptly at 10:30 this morning President H. C. Blackwell called the first session to order, after all in attendance had embarked on the Mississippi river steamer "W. W." Mayor Alfred Mueller, of Davenport, accompanied us to give the formal welcome, which was responded to by Mr. Austin Burt. Both of these gentlemen dwelt upon the great improvement of feeling and increased cordiality of the present relations between public utilities and the municipalities they serve. Routine matters were taken up in succession, and disposed of expeditiously, and the question of next place of meeting referred to a committee.

President Blackwell's address, while not over long, covered a variety of important matters. He touched first upon the need of co-operation between serving companies and municipal officials, to insure good service; the need of better guidance and affiliation in association work; and advised the managers of small works in particular not to overlook the importance of keeping down operating costs while pushing gas sales and expansion. After an enjoyable luncheon the afternoon session opened with the report of the Committee on Nominations, who recommended the following gentlemen for 1914–15 officers, all of whom were elected by acclamation:

President.—Thomas Crawford, Clinton, Ia.
First Vice-President.—G. I. Vincent, Des Moines, Ia.
Second Vice President.—A. W. Borden, Hastings, Neb.
Sec.-Treas.—T. B. Genay, Des Moines, Ia.

The Committee on Place of Meeting reported in favor of Dubuque for next year, with an adjourned meeting at San Francisco for the Exposition and the International Gas Congress. The first formal paper taken up was that of Mr. Jansen Haines, on "Public Relations," dwelling upon the importance of educating the public as to he reasonable requisites of good service and then the obligation to see that it was delivered in good measure. Mr. Alfred Hawsen's paper on "Tar," brought out a general discussion of the increasing value and uses of this by-product and its not uncommon wasteful handling in small plants. So much of interest was developed that the subject was referred to a special committee for consideration, and to report at next year's meeting.

The "Boat Session" was a success in every way, and the ride home a pleasant relaxation after a strenuous business day.

In the evening the entertainment was a smoker, with the very instructive "movies" of "Pipe Manufacture" and "Gas Stove Making," with some lighter features between.—V. S. G.

[Report of second day's session reached us too late for this issue, and will appear in the JOURNAL of June 8th.]

BRIEFLY TOLD.

CHANGE OF DATE OF MEETING OF CANADIAN GAS ASSOCIATION.—Mr. John Keillor, Secretary, announces that the date of the annual meeting of the Canadian Gas Association has been changed from June 11th and 12th to September 3d and 4th, at Ottawa, Ontario. Announcement of the detailed programme will be made later.

INTERNATIONAL ENGINEERING CONGRESS, 1915.—The International Engineering Congress at San Francisco in 1915, will be held the week preceding the meeting of the American Gas Institute, and should attract a good many gas engineers. Among the general subjects to be treated probably the one having the broadest interest is that of materials of engineering construction.

The list of topics in this section is as follows:

(1) Timber.
(2) Preservative Treatment of Timber.
(3) Substitutes for Timber in Engineering Construction.
(4) Brick in Engineering Structures.
(5) Clay Products in Engineering Structures.
(6) Probable and Presumptive Life of Concrete Structures made from Modern Cements.
(7) Aggregates for Concrete.
(8) Slag Cement.
(9) Waterproof Concrete.
(10) Cements containing Additions of Finely Ground Foreign Material.
(11) Economics of the World's Supply of Iron.
(12) The Life of Iron and Steel Structures.
(13) The Employment of Special Steel in Engineering Construction.
(14) The Place of Copper in the Present Engineering Field, and the Economics of the World's Supply Thereof.
(15) Alloys and Their Use in Engineering Construction.
(16) Aluminum in Engineering Construction.
(17) The Influence of the Testing of Materials upon Advances in the Designing of Engineering Structures and Machines.
(18) Cement Testing.
(19) Testing of Metals.
(20) Testing Full-Sized Members.
(21) Proof Testing of Structures.

The papers to be presented from the United States have already been arranged for from recognized authorities on the various topics, and arrangements for those from foreign authors are being rapidly concluded, and the aggregation of papers will constitute a broad review of the field and be of the highest value. Marked interest in the Congress from foreign countries continues, and there is every evidence that the attendance from abroad will be large. It is hoped that all engineers in this country, who have not yet subscribed as members of the Congress, will give the matter their immediate attention and favorable action.

SOCIETY OF GAS LIGHTING RESOLUTION ON THE DEATH OF MR. DUDLEY DIGGES FLEMMING.

Your Committee appointed to prepare a minute in memoriam of our deceased member, Mr. D. D. Flemming, beg leave to report as follows:

Our late member and friend, Mr. Dudley Digges Flemming, departed this life on Friday, April 10th, 1914, at his residence, No. 246 Garfield Avenue, Jersey City. Quiet, as has been his life, so was his end. Long suffering from heart disease and not able to leave his house for some weeks, he laid down on a lounge for a short rest, from which, however, he never awoke. The funeral was held on April the 13th and our Society was represented by a number of its members.

Mr. Flemming was born in Jersey City November 25th, 1843, and was thus in his 71st year. He came of old English stock, long settled in New Jersey, one of his ancestors having been one of the Colonial

Governors. His early education was obtained in the public schools of his native city. Technical colleges had, at that period, not been developed to any extent in this country, but Mr. Flemming managed to widen his knowledge by attending scientific courses at the Cooper Institute.

In 1862 Mr. Flemming entered the employ of the old Jersey City Gas Co., of which his uncle, Mr. Geo. W. Edge, one of our charter members, was the engineer. Upon the death of Mr. Edge in 1880, our late friend succeeded him and successfully and creditably carried on the operations of the company till 1886, when, upon control of the company passing into other hands, he resigned.

He invented a retort furnace bearing his name, which was one of the forerunners of regenerative firing. He also devised furnaces for the more economical firing of steam boilers.

Since his retirement from active work in gas manufacturing and distribution, Mr. Flemming has devoted his entire time to the care of his various private interests.

He always took a lively interest in the public affairs of his City and State, although he never held office, and in testimony of this interest he left in his last will sums of money to several charitable institutions.

He was for many years a member of the American Gas Light Association, but did not follow it into the American Gas Institute when the latter was formed.

Of our Society Mr. Flemming has been a member since March, 1880, and served as its Treasurer from December, 1893, up to January, 1913, and until the state of his health compelled him to lead a retired life he was a constant attendant upon our meetings and always took a deep interest in the welfare of the Society.

His disposition was quiet, simple and without any ostentation. But we, especially our older members, who knew him and his ways for so many years, well know the sterling qualities that underlaid this disposition and will remember him as long as we live. He has gone from us to meet the other good and true men that went before him. Peace to his ashes.

ALEX. H. STRECKER,
ALFRED E. FORSTALL, } Committee.

COMMENCEMENT DAY EXERCISES, STEVENS INSTITUTE OF TECHNOLOGY.—The President and Faculty of Stevens Institute of Technology have issued the formal invitations for its 42nd annual commencement exercises, to be held in the Auditorium of the Institute, Castle Point, Hoboken, N. J., on the morning of Tuesday, the 9th inst. The parade of the Alumni will be on Castle Field, at 2:30 in the afternoon, to be followed by a lacrosse game between teams of Stevens and Swarthmore. Band concert in the evening.

NEW YORK SECTION ILLUMINATING ENGINEERING SOCIETY.—The Illuminating Engineering Society, New York Section, held its regular monthly meeting on May 21st. A good number of members and their friends gathered at Murray's Restaurant, on 42nd Street, at about 6 P.M., and partook of a special informal table d'hote dinner. The meeting was called to order in the new Lord & Taylor store, 5th Avenue, by the Chairman of the Section, Mr. William Cullen Morris, who introduced Mr. Bassett Jones, to speak on the "Lighting of the New Lord & Taylor Store." Mr. Jones' talk, though brief, was illustrated with views of the installation, and all reference to technical details were omitted. Mr. Jones said a great deal of credit was due to Mr. Edward E. Ashley, Jr., who designed the engineering equipment of the building which involved a vast amount of detail. Credit was also given Mr. C. H. Spencer, for his part in the work. Mr. Jones, himself, assisted in working out the lighting effects and the design of the window lighting equipment.

The scheme carried out in the main floors of the store is to approximate as c ⁄se . ◦ DS sible day light values for color; the light intensity throughout the store is high; concentrated Tungsten filment lamps being used, in specially designed semi-indirect fixtures, equipped with one-piece glass dishes. The rest-rooms, restaurants, and other special departments are treated in harmony with their design and decorations. After the lecture an inspection of the buildiug from the 10th floor to the engine room, was made, Mr. Jones describ ing briefly the features of the lighting on each of the floors as they were visited.

NEW ENGLAND SECTION, NATIONAL COMMERCIAL GAS ASSOCIATION.—One of the most successful and interesting meetings of the New England Section, N. C. G. A., was that held at Wesleyan Hall, Boston, on Friday, May 22d. President A. C. Witte, presiding, introduced Mr. H. C. Krafts, Manager of the Pittsfield Coal Gas Company, who read a very interesting and instructive paper on "Intensifying Output." Mr. Krafts' paper brought out some very important points on maintenance of residence lighting, special campaigns conducted by a temporary force of salesmen, and on the value of installing water heaters on a rental basis. Papers prepared in discussion were read by Mr. E. F. Goggin, of the Marlboro Gas Company, J. M. Riley, Commercial Manager of the East Boston Gas Company, and Harry Van Buskirk, of the McKenney & Waterbury Company, of Boston. The reading of these papers started a spirited discussion, most of the members taking part.

Preparations are under way for the third annual outing of the section, and the untiring efforts of the Committee in charge (Messrs. Albert Vegkley, E. F. Ripley and George Smith, Jr.) make it evident that the 1914 outing will be the best ever held by this section. Those in attendance were glad to see that President Witte had fully recovered from his recent illness, and is again in harness.

The next regular business meeting will be held in September, date and place of meeting to be announced later.

MR. JAMES T. LYNN, PRESIDENT OF THE NATURAL GAS ASSOCIATION.—At the annual meeting of the Natural Gas Association of America, just held in St. Louis, Mo., Mr. James T. Lynn, of Detroit, Mich., was elected President. This news gives the many friends of "Jim" Lynn great satisfaction, and the JOURNAL joins with them in congratulating the Association on its success in obtaining the services of Mr. Lynn as its president. Mr. Lynn is a very busy man, but his acceptance of the office is a guarantee that he will make the coming year of the association a successful one. Important developments are taking place in the natural gas industry and men of Mr. Lynn's calibre are needed in official positions to guide it.

"A MAN."—"The Public Service Magazine," in discussing modern business methods and public utilities, has this to say regarding a prominent member of the gas fraternity who does not, however, confine his efforts to that field alone: "The people of the United States owe a great deal to Henry L. Doherty. He was one of the first, if not the first, big utility operator to apply commercial methods to the gas and electrical businesses. He educated men to sell service, organized departments to go after new business, raised money to make extensions into suburbs and remote parts of municipalities, taught his managers to do their share in community development, inaugurated rate schedules based upon scientific principles, lowered the cost of service and brought to many cities a great volume of outside capital, a large part of it from abroad. Doherty started as a poor boy. He made his own way. He believes in courage, optimism, cheerfulness and square dealing. In advancing his own interests and those of his investors he has done it in a way which has benefited the people as well. He is a man who has never lost the democratic viewpoint. Not long ago he remarked:

"I have often illustrated the unfairness of the public's notion of the regulation of public utilities by citing the example of two men, perhaps, going into some little city to day, A putting in a street railway in that city; B buying real estate. At the end of 20 years the city has grown, and both men think that their properties are of very much more value than the original cost; but the public say to A, who built the railway, 'No,' you are entitled only to a normal return above the actual value of your property.' A has helped to make that small village a city, while B has simply been a real estate owner, and could live in Europe if he wanted to, or anywhere else, maybe only called upon to pay nominal taxes on his real estate. At the end of 20 years the real estate owner has realized a profit of 1,000 per cent., and yet the public are very loath to see A get any reasonable profit whatever on his investment. In other words, they are willing to see the unearned increment go to B, who owns the real estate, but they are not willing to see what they call the unearned increment go to the owner of the street railway."

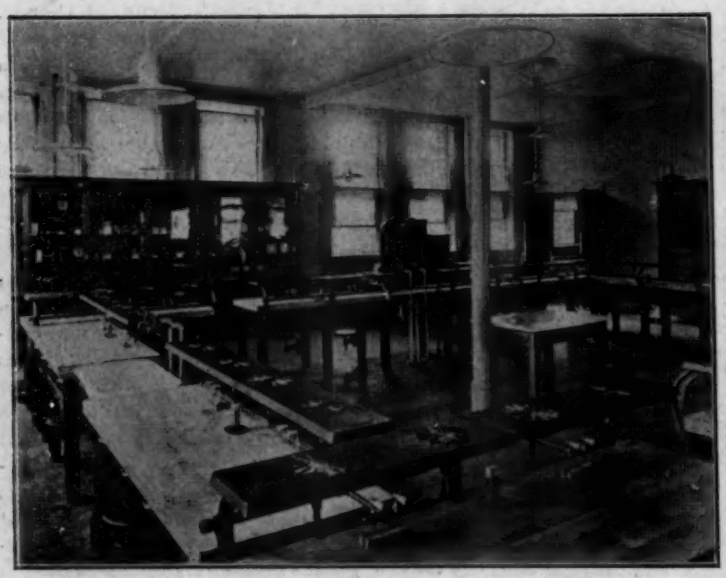
NOT LIABLE.—If a consumer refuses to pay a gas bill and the gas company turns off the fuel, damages cannot be recovered from the company for sickness resulting in the family, so decided Judge John A. Evans, of Pittsburgh, Pa. William Kellner sued the Manufacturers' Light and Heat Company for damages, alleging that the company turned off his gas when he refused to pay his bill, and his children became sick as a result. A nonsuit was granted by Judge Evans.

(*Continued from page* 343.)

will be lasting and the later life of the student will certainly be influenced by them for the good of the community. While gas companies, in the opinion of the public, are far from being humanitarian associations, it is to their credit that their product betters the human race as a factor in their education. The popularity of instructions in cooking is evidenced by articles on the subject in many of the prominent magazines of the day, written by men and women of the highest intelligence.

A great deal of thought and experimental work has been expended by engineers and manufacturers of gas appliances to produce the best, safest and most economical apparatus for the purpose until the present standard seems almost perfection. It is greatly to be regretted that misplaced ideas of economy should effect the fitting up of cooking schools as only the very highest grade of apparatus should be installed. Every part should be constructed in the best possible manner and on simple lines with the thought in mind that high grade appliances mean low cost of maintenance, and less interruption to the student. The effect on the student produced by badly constructed or improperly adjusted appliances, is certainly not conducive to a clear understanding of the instructions received and its value is lost as a result of unwise economy or improper installation.

The cuts shown herewith illustrate the latest installations of domestic science appliances in Milwaukee public schools, as applied for individual and co-operative work.



Domestic Science Department, Clarke Street School, Milwaukee.

Domestic Science Department, School of T ade for Girls, Milwaukee.

MR. E. E. COLLINS, of Grand Forks, N. D., has petitioned the authorities of Dickinson, N. D., for a franchise to erect a plant and supply that village.

The Equipment of a Domestic Science School.

[Read before the Wisconsin Gas Association, May, 1914, by D. G. STROEBEL.]

Much can be said in regard to a domestic science equipment, but the point that I wish to bring out is that a gas range is better for this purpose than a hot plate and a portable oven, which has been the outfit used for many years past. The points of superiority of a range in comparison with the hot plate are many. The main argument in behalf of the range is, that the student will learn to operate the type of appliance that she will use in her own home. In a domestic science school, where hot plates are used, as at the present time are used in nearly every school, the student is not able to get the full benefit of her domestic science course. The gas plate provides the necessary facilities for cooking articles which did not require baking, but when it is necessary to do baking, portable ovens were used by the individual, or one or two large ovens used by the entire class. By this last method one or two students operated the oven for a whole lesson, assuming the responsibility of the baking, hence, out of the entire class only a limited number had the baking experience.

By the use of the gas range, such as the student would have in her own home, the responsibility of baking for each lesson falls directly upon the individual. She learns the care of the stove and if anything is spilled upon it, she is responsible and learns how to clean the stove after such a mishap. Another valuable part of the instruction gained by using a range is the saving of gas. With the range the student learns the use of the simmering burner, which is not found on gas plates. She also learns the use of the large and small burners on the cooking top, and the heat regulation of the oven. None of this can be efficiently taught by the gas plate and portable oven.

Nothing can be said against the use of the regular gas range equipment, except that its initial cost is greater than gas plates. The cost of operation is not greater than when individual gas ovens are used. The results obtained from the use of the gas range are so far superior to any other method, that their use, regardless of the higher initial cost, is advisable.

If the aim of domestic science instruction is to bring the school work as close to actual home life as possible, the use of the gas range for cooking is essential in bringing this about. Two students may use one range, but should have individual desk lockers. They can alternate each week in the responsibility and care of the stove, and in the baking and cleaning. In this way a range may be made to do double duty. Each student has half of the cooking surface, one front and rear burner on either side. In that way a school having 10 gas ranges can easily care for 20 students at a lesson; and 60 to 100 students could take the entire domestic science course, at different hours of the day, from an installation of 10 ranges.

I recommend the square or double oven range for this purpose. The ranges should be accompanied by a complete desk or table placed between the ranges, the ranges being lined up in a row as near as possible. Each desk should have four lockers or drawers in the upper row, and two lockers below for the small cooking utensils. These desks should be made preferably with either a stone or enameled metal top. Wood should not be used for this purpose. The table

should also be built heavy enough that swinging stools may be attached to them for the convenience of students while writing the lecture. They should be of sufficient weight to counterbalance the weight of the seats, in order that they need not be bolted to the floor, and that the floor between the ranges may be easily swept. They should also be built on a sanitary plan, with legs at least 6 inches below the enclosure. The table should be about 2 inches lower than the working top of the range. A very useful attachment in a room of this kind is a towel drying rack. Many different ideas have been used, but perhaps the best one that has been used is the gas pipe drier.

While it is necessary to run a gas pipe from one range to another where it is impossible to get a line underneath, it is a good idea to have the line on a level with the top of the tables, and about 4 inches from the rear of the ranges. These pipes should be enameled or painted, and will then serve as a very satisfactory towel rack.

The proper way for arranging the ranges in a domestic science school where there are from 10 to 20 ranges, is to place them in two rows on either side of the room, with the working side facing the wall. The instructor's desk should be in the center of the room, where all supplies except spices and the like are kept. From this point all students will be in hearing distance of the instructor.

A spice cabinet should be placed at both ends of the room, where two complete assortments of spices, etc., should be kept. A refrigerator of suitable size is part of the necessary equipment together with a large cupboard capable of holding all things too large to be placed in the individual desks. The ventilation of a domestic science school is of importance, and another essential point of the equipment is good dish washing apparatus and drain boards.

From the gas company's standpoint there is little money in the sale of gas to an institution of this kind, but on the other hand the student who learns to cook and bake with gas in a school thus equipped, will never forget how handy and serviceable gas is as a fuel, and if she is fortunate enough to have a gas range in her home, she will certainly appreciate it better and be more anxious to secure its use. Therefore, no gas man should spare any pains, and I might say expense, in helping each school district to have a domestic science school completely equipped with full size gas ranges. A student who has learned to use a gas range intelligently will surely desire a range when she gets ready to use one in her own home, which she probably would not do had she been taught to cook only on a hot plate.

The Relation Between the Melting Point and the Viscosity of Refined Tars.[1]

[By PHILIP P. SHARPLES.]

The rough dependence of the viscosity of refined tars upon their melting point has been long recognized. Many discrepancies have, however been noted and apparently little thought has been given to the relation between the two in making specifications for road uses.

Table I shows a series of samples taken from refined tars made on a manufacturing scale from the same raw tars.

1. Atlanta Meeting of the American Association for the Advancement of Science.

TABLE I.—*A Series of Samples of Refined Tar Made from Same Raw Tar.*

Samp'e No.	Free Carbon Percentages	Distillation Total to 315° C.	Melting Point ° F.	Schutte Penetrometer Sec. at ° F.	Viscosity Engler 100 cc. at 1 0° C. Sec	Float Test at 5 ,° C. Sec.
5.....	12.1	21.8	....	29 40	94	34
7.....	12.0	19.2	....	108 40	127	38
8	14.0	16.4	....	114 50	159	58
9.....	14.4	14.9	86.9	85 60	208	75
10.....	17.2	12.7	99.7	90 70	335	110
11.....	18.2	10.4	108.7	88 80	431	170

The melting point is the half-inch cube method in water, starting, however, at 40° F. instead of 60° F.

The Schutte penetrometer is, strictly speaking, not a penetrometer, but a modified melting point test. An arbitrary melting point is assigned and the time taken at the assumed melting point to force out under constant pressure a plug of the material cooled to 40° F. is noted. The arbitrary melting point is so chosen on a 10° F. scale that the number of seconds is as near as possible 100.

The float test is the New York Testing Laboratory test. The plug was cooled to 41° F. before floating. The Engler test is made under standard conditions, with the exception that 100 cc. were run off instead of 200 cc. The reduction of the number of cubic centimeters, with viscous materials, allows more concordant results to be obtained and gives lower figures.

A comparison of the 3 melting points and the Schutte penetrometer figures show that they advance quite regularly together. Other experiments have shown this same relation to hold, provided the free carbon content is nearly equal. Samples 7 and 8 may then be included in our further examination of the results without introducing undue error.

An examination of the float test shows an increasing interval between samples as we ascend in the series. Between 7 and 8 the interval is 20 seconds, while between 10 and 11 it is 60 seconds.

The results with the Engler viscosimeter show the same tendency much more accentuated. The interval between Samples 7 and 8 is 32 seconds, while between Samples 10 and 11 it is 96 seconds. It is interesting to note that the ratio is the same as in the float test.

A more careful consideration of temperature in testing tar materials with viscosimeters would seem to be indicated. The tars are more sensitive to temperature changes than oils or asphalts and not enough attention has been paid to viscosity changes with temperature.

The work in Table II was undertaken to show that although a specification was rather closely drawn for the Engler reading at 60° C., yet it failed in its object in that it admitted all mixtures of tar H and tar D from 40 per cent. H to 80 per cent. H. Testing the same mixtures at 50° C. shows that the same limit in the upper part of the table would confine the mixture to within 20 per cent. while at 40° C. the same limit would confine it to within 15 per cent.

TABLE II.—*Comparisons of Mixtures of Tar H and Tar D on Engler Viscosimeter—100 cc. at Three Temperatures.*

Mixture Percentage. H.	D.	Free Carbon Estimated Percentages.	Sec. at 40° C.	Sec at 5 ° C.	Sec. at 60° C.
46	60....	4.4	75.7	54.6	41.0
50	50.....	5.0	88.1	57.6	45.6
60	40..	5.6	97.3	62.5	47.0
70	30.....	6.2	110.5	66.3	48.7
80	20.....	6.8	136.1	83.3	56.0

The table also illustrates again the rapid increase in the time interval as the temperature of the determination of the viscosity approaches the melting point. Thus under 60° C. the space interval is 4.6 for the 50 per cent. mixture H, but this is increased to 25.6 for the 80 per cent. H mixture at 40° C.

The examples that have been cited have been in series of tars of nearly uniform composition. An illustration of the effect of free carbon on the relation between the melting point and the viscosity is given in Table III. The effect of the free carbon is very marked. In the Schutte and float test the times are markedly increased. With the Engler the results are more irregular, but show a marked increase with the high carbon tar. From a physical standpoint, the increase of free carbon might be expected to have this effect. It impedes the flow of the material with increase of temperature and in that way up to the point at which the free carbon tends to weaken the binding and lasting qualities of the tar, would seem to be a desirable addition

TABLE III—*Refined Tars—Relation of Viscosity to Carbon Content.*

Sample No.	Free Carbon Percentages.	Melting Point ° F.	Schutte Penetrometer at 8 ° F. Sec.	Engler 100 cc. at 212° F. Sec.	Float Test at 212° F. Sec.
1.....	1.4	110	42.2	302	158
2.....	14.5	109	80,1	298	192
3.....	39.6	113	144.9	739	337

The inclusion of both the melting point and the viscosity in a physical examination of refined tars to be used as binders would seem to be warranted. The viscosity at 100° C. compared with the melting point would give an indication of the behavior of the tar with uniform distributors and also an indication of its resistance to temperature changes when used on the road.

Conclusions.

I.—The viscosities of tars of the same composition vary with the melting point, but not in direct ratio.

II.—The viscosities of tars of the same melting point but of different carbon content increase with the carbon content.

Special English Correspondence.

COMMUNICATED BY NORTON H. HUMPHRYS.

SALISBURY, ENGLAND, May 19, 1914.

Exit the Photometer.—Carbonic Oxide Again.—The British Commercial Gas Association District Conferences.

Those who have followed my previous remarks on calorific and photometric values as an indication of the quality of gas supplied, will not be surprised at the announcement that a Parliamentary Committee has given an important decision in favor of the abolition of the photometer as a legal or penalty test, and that their decision will probably be embodied as a model clause in the gas testing regulations made from time to time by the Board of Trade. The Gas Light and Coke Company are at present under two quality test regulations, (a) 14-candle power by the photometer (b) 550 B. T. U. gross, by the calorimeter, but with a proviso that penalties do not accrue under a higher figure than 500 B. T. U. shown by testings on three consecutive days. They have introduced a bill to abolish the photometrical test, and to amend the calorific test by reducing the maximum to 540 B. T. U. gross, and the penalty limit to 475. They were successful on the first point, but did not get all they asked for on the second. The 540 B. T. U. gross was accepted as the maximum, the penalty limit was fixed at 7½ per cent. less, viz: 499½ B. T. U. gross, and the average of 3 days was reduced to one day. The present system of a flat flame burner test once a week for informative purposes only, is to be retained as a means of safeguarding the interests of the flat flame consumer, but the important feature is that the calorimeter replaces the photometer for the legal tests, and this decision will be generally approved in the profession, as closing a position that has long been felt to be unsatisfactory. The evidence submitted to the Committee is too lengthy to admit any adequate presentment in a paragraph or two, and most of the points brought forward have already been dealt with in these letters. There was a powerful array of counsel for the Gas Company, faced by one equally strong on behalf of the local authorities. When it is mentioned that the witnesses for the Gas Company included Sir Corbet Woodall, Mr. Thos. Goulden, Mr. H. E. Jones and Mr. Chas. Hunt, supplemented by information furnished to the Committee by Professor Boys (one of the Metropolitan Gas Referees), and that Mr. J. G. Newbigging and Professor Vivian B. Lewes appeared for the local authorities, there is no need to say that the evidence affords a complete statement for and against, as it stands to-day. The grounds of the opposition were that the time is not ripe for the change, that the calorific standards proposed were too low, and that uniform conditions of testing should apply to the whole of the Metropolis. It was also urged that the dual test had been in use since 1909, and had not been shown to be prejudicial to the Gas Company in any way, and that, in practice, the proposed arrangement would come to working down close to the penal limit, and the consumer would get an inferior quality of gas to that at present supplied. There was no reason for a wide calorific margin, and a standard of 540 B. T. U. gross was suggested, with cumulative penalties for each 18 units below.

One great trouble with the photometer is the uncertainty of the personal element. The result is not obtained in direct terms of weight or measure, but as inspection or observation, that may vary with different operators, or with the same operator at different periods of the day. There is no personal element with the calorimeter, and after a little experience any intelligent operator can secure results that do not vary when repeated. The wide difference between 540 and 475 B.T.U. naturally attracted some attention. It is only to be supposed that the opposition would assume that the legal margin would be the one chiefly in view, and the testing taken over the last 5 years shows that a much smaller limit would be possible in practice. The suggestion was thrown out that the gas company might go in for the motor spirit business, by extracting benzol from the gas, to the advantage of their own pocket, and a corresponding loss to the consumer. There is much to be said in favor of the views held by Prof. Vivian B. Lewes, who advocated one figure instead of two, with a margin of 5 per cent., which evidently influenced the decision arrived at by the Committee. An important point in regard to the "flat flame" consumer, was also made by Prof. Lewes, to the effect that the flat flame, if retained at all, is in unimportant places, where it is only occasionally used. So that the hours of usage should be considered, rather than the percentage of burners in use, and it is evident that the actual consumption, regarded as a proportion of the whole, is much smaller than might be supposed. It will be found, in 99 houses out of a 100, that all lights in regular use are supplied with incandescent burners.

If any of your readers are fond of amusement, it can always be found by reviewing the efforts of the somewhat large class of people who do not hesitate to "rush in where angels fear to tread," and to propose legislation for the control of matters they do not understand. The speech of Mr. R. Spencer, F.C.S., at a recent meeting of the National Chamber of Trade, in introducing a resolution that referred to the proportion of carbon monoxide in town gas is an excellent example. The resolution set forth that this chamber is strongly of opinion that some reasonable legislative restriction should be placed upon the present unlimited amount of the highly poisonous gas, carbon monoxide, which may be contained in the gas now supplied, and requests the Government, in the interests of the public health, to seriously consider the desirability of adopting the restrictions and safeguards, recommended in a report of a Committee of the House of Commons who investigated the matter in 1899. Mr. Spencer hails from Barrow-in-Furness, a district that is not specially particular about carbon monoxide from blast furnaces, coke ovens, chemical furnaces, etc., and in the course of a Local Government Board enquiry respecting the local gas works, his attention was attracted to the fact that half a million cubic feet of carburetted water gas were made per day, and that a plant for making over a million per diem was in view. Mr. Spencer inquired what became of this large quantity of gas and made the astounding and remarkable discovery that it was distributed, in admixture with coal gas. He was thus lead to a perusal of the 1899 report as above mentioned, to consult the last issue of the Parliamentary returns relating to Gas Undertakings, and to the fact that no action had been taken on the report issued 15 years ago. If there is any truth in his statements, the National Chamber of Trade stands self-condemned of gross negligence "in the interests of the public health" which they are now anxious to consider. It can be proved, when necessary, that the real reason why the Board of Trade have not taken any action on the 1899 report, beyond calling upon gas companies making carburetted gas to furnish particulars of the quantity made in the annual returns, is because they have not seen the necessity for it. The weak point of Mr. Spencer's argument, like most of those adduced by people who endeavor to create prejudice against coal gas or the products of combustion therefrom, is the absence of any positive evidence. He states that the percentage of carburetted water gas supplied by 150 undertakings, ranged from 2½ to 67. I have already remarked that the latest return referred to 1912, and not to 1913, and given the reasons why the percentage of carburetted water gas in that year was above the normal. He also says that the danger increases at a much greater ratio than the percentage of carbon monoxide. But this does not agree with the fact that in the instance of the 67 per cent., no special injury to health, or increase in the number of accidents or fatalities is on record, as compared with the 2½. During the coal strike of 1912, abnormally large quantities of carburetted water gas were supplied, and the fact that nothing occurred during that period, to attract the attention of the public or local authorities, proves conclusively, that for all practical purposes, 25 per cent. of carbon monoxide in the gas supply is no different from 5. After the opinions expressed by Mr. Spencer, it is up to him to explain this anomaly. Gas companies know that the public are not so crassly stupid on matters affecting

their health, as Mr. Spencer and others of his cult would like to believe, and that the supply of any kind of gas that was really injurious would be followed by a steady falling off in demand. The resolution was adopted without discussion, but as a matter of ordinary fairness, a statement from the gas companies' point of view should have been considered before proceeding to vote. However, it is always safe to kick Gas Undertakings.

The British Commercial Gas Association is arranging District Conferences this spring, in various parts of the country. Some half a dozen have already been held, with satisfactory results, both as regards attendances and the matters dealt with. The usual procedure is to assemble early in the afternoon, hold a sitting of 2½ to 3 hours, take 2 hours interval, and meet in the evening to hear a lecture by Prof. Vivian B. Lewes, on the "Hygienic Value of Gas as a Fuel," illustrated with experiments, and followed by a reception. In all cases the local gas company have assisted the proceedings, secured an official reception from the Mayor of the city, or other local dignity, and the leading professional people, doctors, architects, officers of health, etc. (just that class it is difficult to get at by the usual advertising or canvassing methods) have been invited to hear the lecture.

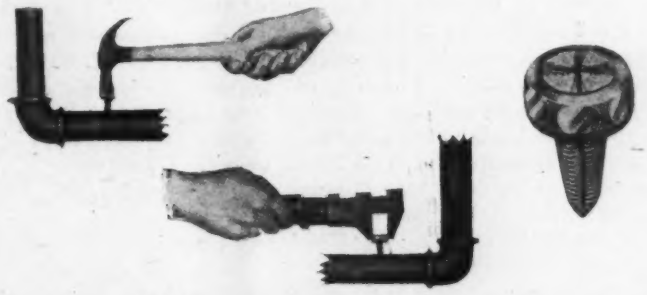
The afternoon meeting includes an address from the President of the meeting, supplemented by remarks from any member of the Council who may be able to attend, and a paper on publicity, methods of extending business, etc., by one of the go-ahead gas managers in the neighborhood, who not only preaches, but practices. And in this connection the managers of the smaller works are coming forward. It does not appear to be recognized that it is the smaller works, rather than the larger ones, that are in need of assistance afforded by the British Commercial Gas Association, and they are just the ones that remain outside the fold. The reason is obvious. In the large works it is the exception rather than otherwise if the manager is not well versed in methods of advertising and canvassing. But, in the small works, exactly the opposite conditions obtain. The governing board is made up of men who know nothing about, and care nothing for, the progress of the gas industry as a whole. The have been accustomed to getting a moderate dividend on their little venture without any trouble on their part; they have no showroom, and leave their customers to the tender mercies of the gasfitter; the stoves and fires in the district may be counted on one's fingers. There are hundreds of little townships throughout the country, of 2,000 or 3,000 inhabitants, where the consumptiom of gas does not exceed as many as 1,000 cubic feet per annum. The price is high because the works are antiquated, and nothing is done towards keeping down working expenses by the use of modern improvements. It is safe to say that a very moderate degree of ordinary enterprises, such as the employment of a competent fitter, opening a showroom, supplying slot meters, with the usual accompaniments, and letting cookers on hire, together with bringing the work's apparatus and the work's management up-to-date, would result in an increased send-out of somewhere about threefold. This would mean cheaper gas and larger dividends.

Even in agricultural towns, where the people rise and go to bed with the sun, it is possible to increase the sales to 3,000 cubic feet per head per annum. Directors of small concerns will do well to recognize the fact that activity exists amongst makers of petrol air, acetylene and electrical apparatus; that the period during which they could earn a comfortable dividend by the simple process of keeping the price of gas to 5s. per 1,000 cu. ft. or so, is drawing to a close; and unless an enterprising policy is followed, the small gas works will certainly experience great inroads on the already low consumption. Let us hope they will be wise in time.

Another feature brought out at these Confereuces is that the number of district or county gas companies supplying an area including several townships, continues to increase. When Mr. Edwards, of Aldershot, remarks that his district covers 128 square miles, and includes over 30 townships, and Mr. Branson, of Caerphilly, relates his experiences in supplying an area of 60 square miles, comprising 19 towns or villages, many of less than 2,000 inhabitants, it is evident that small undertakings within a mile of each other will do well to consider the desirabiity of amalgamation. They would thus be able to secure a degree of professional talent for the control of their business, that is at present beyond their reach, and to avail themselves of the full benefit afforded by modern improvements in apparatus. The steel trunk main, with high pressure distribution, is rapidly becoming one of the most important features in connection with the gas industry.

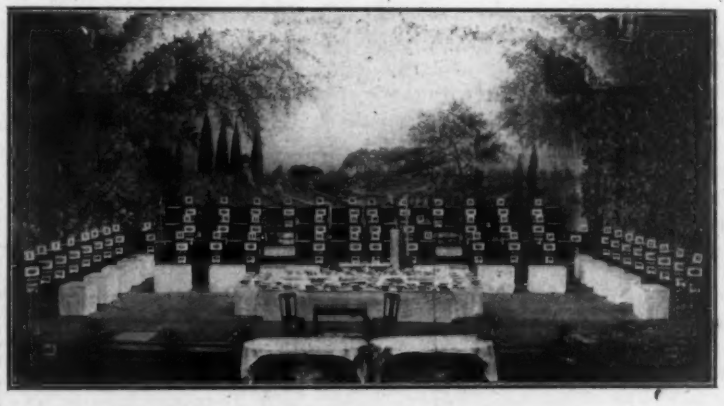
New Methods and Appliances.

MAKES AND TAPS ITS OWN HOLE.—This "Rapid Tap Plug" is a device for repairing small holes in cast or wrought iron, tanks and fittings.



Just start it with a hammer and turn down with a wrench. It is made of tempered steel, has machined threads with a milled slot giving them a cutting edge, and is really a combined drill, tap and plug.

DENVER'S COOKING SCHOOL.—The Denver Gas and Electric Light Co., in conjunction with the Denver "Post" have just completed a 6 days' cooking school in the Auditorium, which comprised afternoon and evening lectures by Mrs. O. H. Hillyer, and baking or cooking contests each day. The stage setting with 50 Cabinet gas ranges connected for the competitors is shown in the photograph.



Cash prizes of $500 were awarded in addition to daily prizes of merchandise competed for by those in the audience, which completely filled the theatre at every session.

The scheme and its details originated with the advertising and commercial departments of the Company, and was carried to superlative success by Mr. Clare N. Stannard, assisted by Mr. J. M. Connelly and Mr. R. G. Gentry. The lavish and effective advertising by the Denver "Post" contributed much to the very gratifying results. Friday's evening contest was probably the most popular. The programme for that evening was as follows:

FRIDAY EVENING, MAY 15, 8 P.M.

"How Well-Cooked Food Contributes to the Enjoyment of Camp Life." Lecture by Mrs. Hiller.

Camp cooking, by men only, in teams of two, one to bake biscuits and the other pancakes. Prizes, $15 and $15.

Conditions for Contest.

The team receiving greatest number of points, first prize; team receiving next greatest number of points, second prize. Points counted as follows:

Best outdoor make-up, 30 points.

Team man putting first finished biscuit on table, thoroughly baked, 15 points.

Team man first putting six finished pancakes on table, 15 points.

General appearance of biscuit as to color and texture, 20 points.

General appearance of pancakes as to fluffiness and color, 20 points.

Men are to wear their hunting and fishing clothes, also fishing boots and shoes. The team looking fittest to enjoy themselves in care-free, jolly way will receive the points for this feature.

There will be a free mountain trout try for the audience.

Prize Drawings.

The evening's programme will conclude with drawings for the following prizes:

First Prize—Case J. S. B. Goods.
Second Prize—Blue Hill Products.

ACCIDENTS AS RELATED TO THE TIME OF THE WEEK.—The question of the influence of the day of the week on the numbers of accidents was touched on recently in an address by Dr. Harold H. Baker, at a meeting of the Efficiency Society of Rochester. Figures, covering 1,300 accidents, showed that Mondays and Saturdays were productive of a much higher percentage of accidents than other days of the week. The daily number of accidents, on an average, were found to be as follows: Monday, 253; Tuesday, 196; Wednesday, 194; Thursday, 197; Friday, 195; Saturday, 265.

This was explained thus: On Mondays the workmen are not properly keyed up to their tasks; there may have been dissipation over Sunday. In other words, their minds are not alert. On Saturdays the same conditions exist, except that the men are rushing their work, or their minds are on plans for the rest-day.

"Only 15 per cent. of factory workers are physically perfect," said Dr. Baker. The percentage summary of defects was given as follows: Defective eyesight, 15 per cent.; predisposition to tuberculosis, 15 per cent.; rupture, 4 per cent.; heart disease, 4 per cent.; defective hearing, 12 per cent.; defective teeth, 45 per cent.; not fully immune against smallpox, 42 per cent.; operated on for appendicitis, 8 per cent.; defective feet, 6 per cent.; digestive troubles, 8 per cent.

HEAT TREATED STRUCTURAL STEEL.—To heat-treat structural steel will eventually be the common practice, in the opinion of James H. Herron, in a recent paper read before the Cleveland Engineering Society. There seems, he said, to have been a tendency to increase the strength by increasing the carbon and manganese, but this is hazardous in the face of possible dynamic stress, and it is much better to use a little extra material and keep the carbon content in the medium range. The elastic limit should be considered the real measure of strength of any steel. Nickel steel of above 0.25 per cent. carbon is becoming popular, as this steel has a value of from 15,000 to 20,000 pounds unit value over carbon steel of similar composition.

Recent Patent Issues.

Prepared for the AMERICAN GAS LIGHT JOURNAL by ROYAL E. BURNHAM, solicitor of patents and counselor in patent causes, 833 Bond Building, Washington, D. C., from whom illustrations and specifications of any patent mentioned below may be obtained for 20 cents.

1,095,208. Gas Lamp. A. H. Humphrey, New York city.
1,095,209. Valve Operating Device. A. H. Humphrey, New York city.
1,095,210. Gas Lamp. F. J. & R. Humphrey, Kalamazoo, Mich., assignors to General Gas Light Co., same place.
1,095,217. Gas Generator. F. Krauss, Munich, Germany.
1,095,280. Gas Burner Tip. P. Keller, Chicago, Ills., assignor to J. C. F. Royer, Chicago, Ills.
1,095,295. Gas Burner Valve. M. P. Stevens, East Orange, N. J.
1,095,296. Lighting Fixture. M. P. Stevens, East Orange, N. J.
1,095,390. Valve Mechanism for Automatic Gas Lighting and Extinguishing Apparatus. F. C. Farge, Nice, France.
1,095,424. Gas Distributing System. G. F. Schmidt, Chicago, Ills.
1,095,512. Combined Gas Supply and Lighting Device. E. R. Mills, Sabina, O.
1,095,540. Gas Burner. D. Anderson, London, England.
1,095,795. Gas Burner. C. F. Brand, Wheeling, W.Va.
1,095,806. Process of Making Gas. H. Burgi, Springfield, Mass.
1,095,836. Gas Washer or Scrubber. W. J. Fiddes, Tottenham, England.
1,096,042. Globe Holder. T. J. Litle, Jr., Woodbury, N. J., assignor, by mesne assignments, to Welsbach Light Co., Gloucester City, N. J.
1,096,148. Combined Meter and Valve. A. A. Bowser, Fort Wayne, Ind., assignor to S. F. Bowser & Co., same place.
1,096,223-4. Apparatus for Use in Manufacturing Gas. J. E. Cochran, Elkhart, Ind., assignor to The National Gas Process Co., same place.
1,096,228. Gas Measuring Instrument. J. P. Delaney, Pittsburgh, Pa., assignor to Municipal Supplies Co., same place.

Items of Interest
FROM VARIOUS LOCALITIES.

MR. CARL H. GRAF, General Manager of the Indianapolis (Ind.) Gas Company, has resigned that position to become Vice-President and General Manager of the Municipal Gas Company, Albany, N.Y. Our informant says: "It is with sincere regret that his friends and business associates in the West see him leave Indianapolis."

BY a vote of nearly 3 to 1, in a very representative total of 1,700 votes, the people of Mason City, Ia., ratified the petition of the Peoples' Gas and Electric Company for a 25 year franchise. The gentlemen who purchased the utility have been in Mason City more or less since the transfer of the property, and have impressed all who have met them as democratic in their methods, frank in their discussion, and honest in their purpose. It will be easy for them to retain this good opinion and good will, by rehabilitating the plant as contemplated and give their patrons further benefits in the way of improved service and reduced rates.

"J. W. B.," WRITING from San Juan, Porto Rico, says that the Porto Rico Gas Company has 3,000 consumers and expect to double that number by December. They have trained a dozen native cooks to go from house to house demonstrating how to use gas, and new orders come in every day. Some out-door arc lighting is being gotten but as the stores keep open Saturday nights only, the direct revenue from this source will not be as large as "in the States."

THE Yuma Gas Company, Yuma, Ariz., put these rates in effect May 1, 1914: First 600 cubic feet or less, $1 per month; first 10,000 cubic feet, $1.75 per 1,000; next, 20,000 cubic feet, $1.50 per 1,000; and all in excess of 30,000 cubic feet, $1,25 per 1,000.

AT the final meeting of the Consumers Gas Company (Toronto, Canada) Employees' Educational Association, for the 1913-1914 season, Mr. H. E. G. Watson, industrial fuel representati ve of the company, gave an interesting talk, illustrated by lantern views, of hotel and restaurant appliances, showing how varied were the uses for gas in such work. Mr. A. L. Boyd, of the Sheldon School of Business Science, followed with a lecture on the law of mutual benefit, calling for more co-operation between employer and employee. Mr. G. W. Allen, of the advertising department, showed by charts and blackboard diagrams how system is used in the advertising department, in the proper construction and laying out of advertising matter. The meeting was one of the most successful from an educational point of view of any held.

THE Laclede Gas Light Company, St. Louis, Mo., has started work on the new coke oven plant on lower Broadway. The installation comprises 56 ovens of 16 ton capacity each, with coke handling apparatus, ammonia plant, pump houses, central power plant, office building, and a 1,000,000 cubic foot capacity holder. Contract for the holder has been awarded the Western Gas Construction Company, of Fort Wayne, Ind.

MR. ROGER W. POLK has resigned his position as gas engineer of the Laclede-Christy Clay Products Company, St. Louis, Mo. Mr. Polk has been with the Laclede-Christy Company for 10 years, and is well and favorably known to the gas industry throughout the country. Mr. Polk is a young man of great ability and his services, no doubt, will be in demand. The JOURNAL knows his ability as an engineer and the success he has brought to the Laclede Christy people. May good luck attend him.

LAMBERTVILLE, N. J., may have its gas rate reduced from $1.60 per thousand cubic feet to $1.50, if the people of the vicinity will subscribe for $15,000 worth of the company's bonds. This is the proposition submitted to the Chamber of Commerce by President John A. Riggins, of the New Jersey Northern Gas Company. Later reductions may bring it to $1.40, or eventually to $1.25, but Mr. Riggins said that it was totally unlikely that a lower figure than this would ever be reached, and this not for some years.

THE Boston, Mass., Street lighting contracts are still unexecuted. The majority of the Councilmen are opposed to the Boston Consoli-

dated Gas Company's proposed contract for lighting by gas, and although it may be some weeks before the City Council formally turns down the proposition at a regular Council meeting, members of that body say that nothing can convince the majority of the members that the proposed contract should be accepted.

THE Twin State Gas and Electric Company, Dover, N. H., is investigating possible locations for its gas plant, which must be moved from its present location. The plant is on land owned by the Central Vermont Railroad, which started proceedings to have it moved several months ago. The matter has been dormant since the ejectment proceedings were brought until recently, when the gas company began to look for a new site. They hope to find a location near the railroad.

WEDNESDAY the various departments at the New England Gas and Coke Works, Everett, Mass., got together at an appointed hour, and in an appropriate speech, John Bruce presented, on behalf of his associates, a beautiful silver loving cup to General Superintendent John M. McClellan, who has been promoted to the Boston office. Superintendent McClellan was visibly affected but managed to respond in a neat speech, He has been popular with all branches of the operating force at this mammoth plant and his departure is a matter of general regret all around.

MR. H. E. MILLEN, Superintendent of the People's Gas Company, of Deadwood, S. D., is trying to interest the business men of Belle Fourche, S. D., in a project to erect a gas plant. The Commercial Club of Belle Fourche is inclined to give its help and it is thought that the necessary $20,000 can be raised.

PLANS have been filed and a permit issued for a two-story building to be erected near State and Water streets for an office building for the Springfield (Mass.) Gas Light Company. The building will be about 100 feet south of Water street on the northerly side of State street. It will be 44 by 33 feet in size and will cost about $9,000.

VICE-PRESIDENT and General Manager John A. Frick, of the Allentown-Bethlehem (Pa.) Gas Co., has asked for a permit for the erection of buildings which, when completed, will double the generating capacity of the Allentown plant. Engineer A. C. Taylor, of Allentown, will have charge of the construction of the new buildings and generating apparatus, assisted by George Neall. When the addition is complete with generating apparatus installed, the Allentown-Bethlehem Company will have made an expenditure of $150,000. The company is working 150 men on extension of mains in Bethlehem and Catasauqua.

AN extension to the Rutland, Vt., gas works, of which will mean an increase in the productive powers of the plant by 22,000,000 cubic feet per year, has been decided upon by officials of the Rutland Railway, Light and Power Company, and contracts for the proposed changes have been signed. The new bench will be installed by Waldo Brothers of Boston, the brick and masonry work will be in charge of A. A. White, of Rutland, and the steel roof will be constructed and placed by the Holmes Iron Works, of Rutland.

THE Waynesboro (Pa.) Gas Company has moved into its new offices at Main Street and Potomac Avenue. The exterior of the new building is illuminated by 5 outside arc lamps, making that corner a blaze of light. The interior lighting is by semi-indirect fixtures, giving an exhibition of the latest lighting effects.

NEW ULM, Minn., is promised a gas plant by Mr. J. A. Kennedy of Virginia, Minn. The works plot is yet to be purchased, but construction work will begin by July 1st. Contracts for the apparatus are to be placed at once.

CONGRESSMAN R. P. HILL, of Illinois, is soliciting gas franchises from the cities of Williamson County, Ill., with the intention of building a central plant to supply Herrin, Marion, Johnston City and Centerville. The possible expense for plant and distribution systems is put at $250,000.

SUPERINTENDENT PATRICK COYLE, of the Charlestown (Mass.) Gas Company, has rounded out 50 years of service with the Company. In recognition of his long term of faithful service, an appreciative letter was sent to him by the Directors, together with a substantial check.

THE gas plant in Hastings, Mich., will be greatly improved in equipment by the Thornapple Gas and Electric Company. The present settings of the retorts will be removed and placed with a new outfit of the latest pattern. A new exhauster and additional piping will be installed. A large concrete coal shed will also be built. The Company, which furnishes power and current for Caledonia, Middleville, Hastings, Nashville and Lake Odessa, will also build a new concrete substation and transformer house in Lake Odessa. About 3,000 feet of gas main will be laid in Hastings.

THE Springfield (Mass.) Gas Light Co., recently entertained hotel men of Springfield, Fitchburg, Worcester, Rochester, N. Y., and Albany, N. Y., with a demonstration of the new surface combustion hotel appliances. A local paper says: "Instead of a blue flame, a live coal flame of intense heat and less cost of operation is used. The burners are back of a coating of silicate quartz, and air is forced in by an electric blower. The mixture of air and flame strikes the quartz, making it incandescent and generating an economical and adaptable heat for cooking purposes."

A MEETING of the employees of the Roanoke, Va., Gas Light Company was held recently to organize a study club for the mutual educational and social good of the employees. Twenty-one employees were present and the enthusiasm shown bids fair for a successful and permanent organization. Officers were chosen as follows: President, William R. Bradley; Vice president, H. H. Dunn; Secretary-Treasurer, R. G. Hay. C. H. Geist, President of the Roanoke Light Company; H. S. Schutt, General Manager of the C. H. Geist Company, and D. H. Foster, Advertising Manager of the C. H. Geist Company, were elected honorary members.

The City Commissioners, of Birmingham, Ala., intend to make another proposition for a by-product gas contract with the Birmingham Railway, Light and Power Company, following the report of C. C. Brown. Mr. Brown is an expert from Indianapolis, and was brought down by the Commission to make an investigation into conditions in Birmingham. He will go over the ground thoroughly, investigating all ends, and will then suggest to the city what contract would be fair. The city has reason to believe the Birmingham Railway, Light and Power Company would consider a proposition.

A BID has been reported in the Massachusetts Legislature requiring that every corporation or company, whether private or municipal, which manufactures or distributes gas shall be required to install a safety gas cock on all supply-pipes outside of public buildings, factories or places where persons are employed, and also outside of all tenements or lodginghouses which are occupied by more than one family, and that contain more than 12 rooms.

WORCESTER, Mass., as the flight headquarters of the New England Aero Club, seems to be an assured thing, as the result of a visit to that city recently, by John J. Van Valkenburg, President of the Club, and Charles J. Glidden, of Boston, a director. The Worcester men interested in ballooning, met the visitors and showed them a lot of land on Quinsigamond Avenue, adjoining the plant of the Worcester Gas Light Company, that can be fitted up for balloon ascensions for a comparatively small cost. On the east side of the lot is Crompton Park, where thousands of spectators might assemble to witness the ascensions. The gas company is prepared to do its part in supplying gas for the balloons after the proper pipe connections are provided.

H. M. WRIGHT, Master in Chancery, rendered a decision, upholding the gas rate of 75 cents per 1,000 cubic feet, set nearly a year ago by the Board of Supervisors of San Francisco, and ordering the Pacific Gas and Electric Company to refund to consumers $300,000 collected from them during the last ten months, during which time the gas company has been charging 85 cents per 1,000 cubic feet.

THE city of Wheeling, W. Va., no longer can obtain a gas monopoly, according to a decision recently by the Supreme Court of Appeals. Wheeling long has sold artificial gas to private consumers from its municipal plant and later acquired a supply of natural gas, and sold that also. Recently franchises were granted to the Natural Gas Company, of West Virginia, on the ground that the municipal supply was insufficient. The city sought to enjoin the company from exercising its rights and lost the case in the court of last resort.

Utilities Commission News.

APPOINTED TO NEW YORK COMMISSION.—Mr. Robert C. Wood has been appointed and confirmed as a member of the 1st District, New York Public Service Commission, succeeding J. E. Eustis, whose term expired on February 1st. This is the vacancy to which Surrogate G. M. S. Schulz was asked by the Governor to accept appointment but which he declined.

CONTEST AGAINST CALIFORNIA COMPENSATION LAW.—The Great Western Power Company and the Southern Pacific Company are leading an attack upon the California compensation law, in effect on Jan. 1, 1914. The law gives a commission practically unlimited authority in the award of damages, and the decision on the question of requiring special equipment in manufacturing plants. The companies mentioned, which are taking the initiative in the contest against the law, are prominent exponents of the "safety first" movement, but feel that the new measure is so radical that it is necessary for them to take steps against it. The companies are supported generally in their decision by manufacturers and employees of the State, who fear that the power granted the commission might be abused if political changes should place the control of the commission in other hands.

AUTHORITY OF WEST VIRGINIA COMMISSION ATTACKED.—Believing that the usefulness of the Public Service Commission as an agency of government is at stake, the West Virginia authorities are preparing with all the means at their command to resist the attack made on the jurisdiction of the Commission in the Federal Courts by the Manufacturers Heat and Light Company, of Pittsburgh, in which the gas company supplying gas to scores of cities and towns in West Virginia, Ohio and Pennsylvania seeks to restrain the Commission in the regulation of rates and of service to consumers in West Virginia cities.

DISCOUNTS OR PENALTIES.—The question of whether discounts for prompt payment of the gas bills must be given, instead of penalties imposed for nonpayment within a specified time, has been decided by the Public Service Commission, of Maryland, in the case of the Hagerstown Heat and Light Company. Engineer C. E. Phelps reported that the Company had been billing a certain rate, with 10 cents a thousand feet added as a penalty when the bills were not paid within a specified time. It will be instructed to establish, instead, a gross rate, less 10 per cent. for prompt payment. It is stated that the courts have recognized the practice of allowing discounts, but have never countenanced the imposition of penalties.

OHIO COMMISSION ADMITS NO JURISDICTION IN AN IMPORTANT MATTER.—Dismissing the appeal of the Union Gas and Electric Company of Cincinnati from the provisions of an ordinance of the city requiring certain extensions of gas service, the State Utility Commission decided it was without jurisdiction to hear and determine the issues involved. While it has appellate powers to hear cases and review ordinances fixing rates, there is no provision in the law permitting the Commission to pass on questions of gas main extensions. If the Union Company has any relief it is another tribunal, not with the Utilities Commission.

THE Sangamon Circuit Court at Springfield, Ills., is expected to hand down early in June a decision of importance to public service corporations, in a case brought for an injunction to prevent Springfield from combining its light and power plants and thus producing energy for commercial use and competing with the Springfield Light, Heat and Power Company. The contention is that the section of the State Public Utilities Act which exempts from the jurisdiction of the State Commission municipally owned utilities, is unconstitutional. The Springfield Light, Heat and Power Company has a franchise from the city, and for many years it has been supplying all private consumers. Some years ago a municipal plant was organized to light the streets. The Commissioner of Public Works, about a year ago, conceived the idea of combining the city light plant and the city water-works plant and selling energy. Many people opposed the plan, so the city officials began to install an electric plant at the water works by piecemeal. It was proposed to buy a 750-kva generator, and then to add other units, and in the meantime to keep the city's electric plant in operation independently. A referendum election was held and the people voted in favor of the plan. It is contended that the city must get permission from the Public Utilities Commission before installing the generator, and that the section giving the city advantage over the private company to the detriment of the company, violates the Federal constitution.

Financial Notes.

NOTICE has been given by the New York Stock Exchange that the common Stock of the American Cities Company has been stricken from the list, as it is stated, that 95 per cent. of this stock has been turned over to the United Gas and Electric Corporation, which absorbed the former Company about a year ago. As only 5 per cent. of the stock is now in the hands of the public, it was considered unnecessary to maintain quotations for the issue.

THE Republic Railway and Light and subsidiary companies report gross earnings for April of $253,728, an increase of $24,011. The net earnings for the month were $110,972, an increase of $26,494. For the 12 months ended April 30 last the gross earnings were $3,066,881, an increase of $287,629, and the net earnings for the same period were $1,216,088, an increase of $118,565. The surplus after interest was $685,074, an increase of $122,926.

PEOPLES Gas (Chicago) shows some improvement on the local exchange, the price advancing to 121¼. It is assumed that the company's gross receipts are larger than 1 year ago, due to the normal gain in population. But the market for the shares has for several months lacked any enthusiasm. The stock pays 8 per cent., and in an easy money market like the present one it should be selling near at least a 6 per cent. basis. At a price of 121 the shares yield 6.6 per cent.

THE Brooklyn (N. Y.) Union Gas Company declared the regular quarterly dividend of 1½ per cent. and the usual semi-annual extra dividend of 1 per cent. The semi-annual extra dividend goes toward the completion of the plan to make dividend payments since 1905 average 6 per cent. Including the extra dividend declared to-day, 6 per cent. has been paid for this purpose, and 3½ per cent. remains to be declared.

THE Laclede Gas Light Company (St. Louis, Mo.) has declared the regular quarterly dividend of 1½ per cent. on the common stock and the regular semi-annual dividend of 2½ per cent. on preferred stock, both payable June 15. Books close June 1 and re open June 16.

EARNINGS of the subsidiary companies of the Standard Gas and Electric Company for the year ending February 28 were: Gross, $14,077,589; increase, $711,675. Net, $6,372,505; increase, $292,443.

STONE & WEBSTER advise that a semi-annual dividend of $3 per share on the preferred stock and a quarterly dividend of $2 per share on the common stock of the Blackstone Valley (R. I.) Gas and Electric Company have been declared, payable June 1 to stockholders of record at the close of business May 20, 1914; also that a quarterly dividend of $1.50 per share has been declared on the preferred stock of the Connecticut Power Company, payable June 1, to holders of record May 20, 1914.

THE American Gas and Electric Company has notified its shareholders that a special meeting will be held on June 3 to act on a proposition to increase the capital stock of the Company by issuing $500,000 common stock, par value $50. No announcement was made as to when the new stock, if authorized, will be issued, or the basis upon which stockholders will be allowed to subscribe.

EARNINGS statement of the Central California Gas Company for April shows an increase of approximately 50 per cent. in gross and 42 per cent. in net earnings, as compared with the same month in 1913. Net earnings are in excess of twice the interest charges on the $275,000 first mortgage 6 per cent. bonds outstanding. Gross operating revenue for the month was $6,583, an increase of $2,185, and expenses and taxes increased $294 to $2,593. Net revenue amounted to $2,990, $891 greater than in April of last year. For the twelve months ended April 30, 1914, gross earnings were $74,515, expenses and taxes were $39,910, leaving net earnings of $34,605.

STOCKHOLDERS of the Consolidated Gas Company (New York) voted to increase authorized stock from $100,000000 to $125,000,000 and to keep $25,000,000 additional stock in treasury pending conversion of $25,000,000 6 per cent. debentures, convertible into stock at the end of 3 years. Debentures authorized by trustees will be issued as soon as the consent of the Public Service Commission is obtained.

THE Portland, (Ore.), Gas and Coke Company reports gross earnings for April of $103,546, a decrease of $1,835 from April of last year, and net earnings were $52,601. $753 less than in 1913. Income account after interest charges were $31,809, a decrease of $1,592. Gross earnings for the 12 months ending April 30 were $1,283,229, an increase of $64,606, or 5 per cent., while net earnings increased $55,196 to $656,997. Balance for the period was $268,008, a loss of 7 per cent.